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ROUND MOUNT McKINLEY.

(MAP, p. 326.)

BY

FREDERICK A. COOK.

To men of a polar turn of mind it is easy to be diverted from solitudes of the Arctic ice fields to the snowy slopes of great altitudes. Polar exploration and high mountain climbing are twin efforts which bring about a somewhat similar train of joys and sorrows. After a series of fortunes and misfortunes in the Arctic and Antarctic, I decided last summer to devote myself for a time to mountaineering. I selected as my first point of attack the highest peak of the Alaskan Range, the most Arctic of all great mountains, which has been given the name of Mount McKinley by W. A. Dickey, an Illinois goldseeker. The task proved to be a prodigious one; and while we did not scale the icy spires which pierced the frigid blue above the frozen mist, we did attain an altitude of 11,400 feet, circled the most remarkable range in North America, and discovered a good deal of new country.

The expedition was organized in April, 1903. The party was necessarily small, and the supplies light because of the great difficulty of reaching the base of Mount McKinley over hundreds of miles of a trackless wilderness. My principal companions were Robert Dunn and Ralph Shainwald, from New York; and from Seattle, Fred. Printz and Walter Miller. The expedition, with its outfit and fifteen pack horses, left Seattle on June 9th on the steamer *Santa Ana*. The voyage with the hopeful Alaskan prospectors in the quiet inland seas was delightful. On June 23d we landed at Tyonek, on the north shore of Cook Inlet, and now we were confronted with the hard task of transporting supplies and walking to the great mountain.

We chose as the most promising slope for the first ascent the western side. To reach this side it was necessary to march nearly five hundred miles over swamps and tundra, through glacial streams and dense forests. With our outfit packed on fourteen horses, we started for our long, weary tramp from Cook Inlet lake in June. For the first thirty days we had an almost continuous series of cold rains, and during this time the horses and men were tortured by mosquitoes. After we crossed the range, however, the mosquitoes disappeared, the weather improved, and game was everywhere abundant. Here, along the northern slope of the McKinley group, we crossed the best game country in America. Caribou, moose, mountain sheep, and grizzly bears were constantly in evidence. With an abundant supply of fresh meat for ourselves and good grass for the horses we here made rapid progress. On August 14, after forty-nine days of difficult marching, we pitched a base camp fourteen miles northwest of the summit of the great mountain.

Mount McKinley presented a formidable face from our camp. The upper ten thousand feet were, during the day, usually wrapped in dark clouds. The best view was obtained when the sun was lowest, and by far the most impressive view was during the long hours of the blue twilight. In a bright light the mountain seemed dwarfed. The foothills, the glacial depressions, and the striking irregularities were then run together into a great heap of mingled snow and rock, but the feebler play of light at dawn and sunset brought out all of the sharp edges, the great cliffs, the depressions, the lesser peaks, and the difficult slopes. To the northeast there was a long ridge with a gradual slope; but this ridge was impossible as a route to the summit, because it was interrupted by several lesser peaks which absolutely barred the way. To the southwest there was a more promising ridge, also interrupted by a spur; but this spur we hoped to get around. The western face of the great peak between these ridges, above twelve thousand feet, was an almost uninterrupted cliff of pink granite, so steep that snow would not rest upon it. Hence, the only way to the summit from the west was along the southwesterly ridge.

On the morning of the 17th we moved our entire camp along the southerly fork of the headwaters of the Tatlathna River, crossing near the first moraine and pitching our base camp at an altitude of 4,000 feet. Here grass was new and sweet for the horses, but an almost constant rain made it an undesirable place for camping. For three days a strong southeasterly storm had been raging, bringing great cumulus and nimbus clouds through depressions across the

range, and blotting out the upper slopes of the giant peak; but now there was an occasional break, giving us a glimpse of the bewildering heights of dazzling ice. Our course had been previously mapped from the lower camp, but as we rose up under the clouds close to the snow-line it became more and more difficult to pick a workable track. Our first destination was a point on what we believed to be the southwest ridge, at an altitude of ten thousand feet. With a few of our horses we ascended into the valley before us to the top of a large moraine. This led us on to a glacier which came out of a huge amphitheatre. We supposed, from the imperfect views which we had been able to get, that the eastern foot of this amphitheatre butted against the southwest ridge. As we reached an altitude of 8,300 feet, however, we discovered that we were on a ridge separated from the main mountain by Peters Glacier, and that farther progress was stopped by a great depression with precipitous walls. While here it snowed almost constantly, and the clouds drifting against us were so dense that we could only get an occasional view of the slopes but a few hundred yards away. From the line of this first attack we did not at any time see the main mountain, above eleven thousand feet.

The second attempt was made over the surface of Peters Glacier; making a base camp at five thousand feet near the northeast ridge, we then packed our supplies back to the southwest ridge to an altitude of eight thousand feet. We only ascended a few hundred feet before it became necessary to cut steps. The task of making steps was particularly difficult, because it was necessary to remove fourteen inches of snow before reliable ice was reached. Steps were thus cut for three thousand feet, and floor space was cut for our tent at night, to keep from sliding into the dark depths below; but then we were faced by an arête, with a nearly vertical granite wall, which loomed up four thousand feet. Here was an obstacle absolutely insurmountable. Though we were in splendid physical training, with an abundance of food in our sacks, we were forced to descend, because there was no other possible route from this side, and our previous reconnaissance had convinced us that the line of attack which we had pursued was the only route from the west.

The winter was advancing too rapidly now to think of making a formidable attack from the north or east, but we desired to swing around the range and return along the eastern slope. We crossed about fifty miles northwest, marched for one hundred miles over uncharted country, examined Mount McKinley from the east, left our horses, and then rafted down the Chulitna and Sushitna Rivers,

getting back to Cook Inlet on September 26, three months after our start.

Mount McKinley is now known to be the highest peak in North America—20,300 feet. It is in middle Alaska, about one hundred and thirty miles north of the headwaters of Cook Inlet. It is a great mountain from every point of view—great in altitude, great in its general dimensions, and from whatever point of observation it stands out as a giant peak. From the west it rises abruptly out of a vast expanse of low grassy country, dividing the drainage of Alaska's three greatest rivers—the Yukon, the Kuskokwim, and the

MT. MCKINLEY.

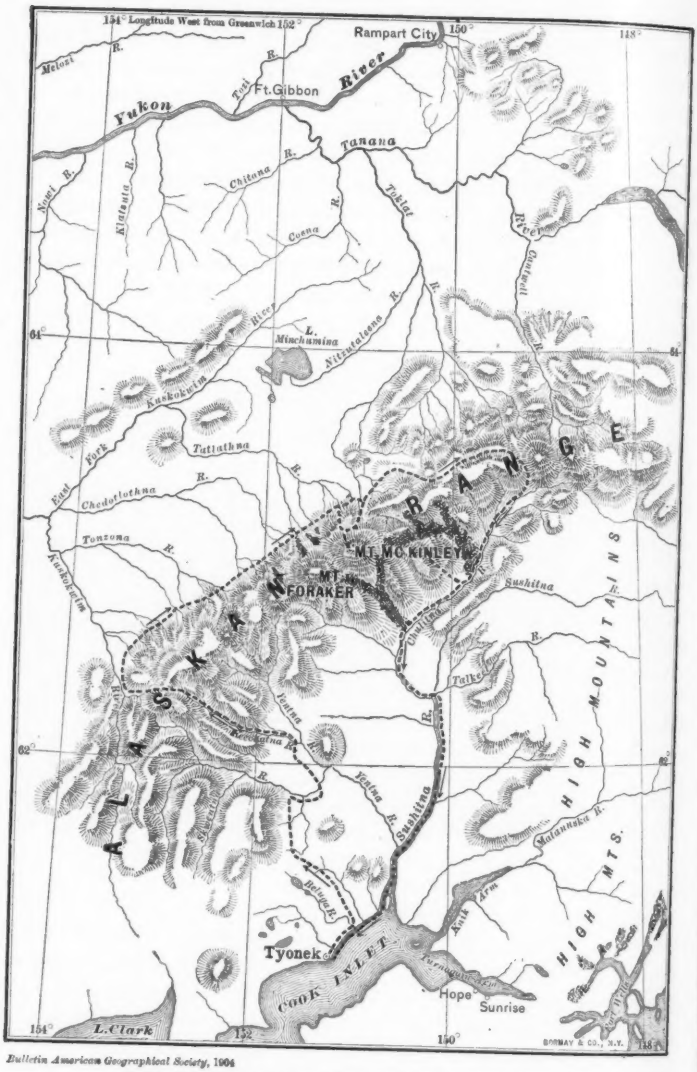
Sushitna Rivers. To the north and south the main range, of which Mount McKinley is a part, is ten thousand feet high—sharp, narrow, and crested with huge icy cornices. There are a few pyramidal foothills as one approaches from the west, and these lead up to a single ridge (Roosevelt Ridge) ten thousand feet high, weighted down with many overhanging glaciers. This ridge extends northeasterly for sixteen miles parallel to the whole western face of the great mountain.

Beyond Roosevelt Ridge, and separating it from Mount McKinley, is a great glacier flowing through a deep gorge. The whole western

face of the great peak is swept by this (Peters) glacier. It begins along the southern cliffs, at an elevation of 8,400 feet, in a huge granite amphitheatre. The glacier describes a sharp curve around the southwestern ridge and then follows the indentations of the main mountain, taking a general northeasterly course, descending to 5,100 feet under the northwestern ridge. From here the icy stream turns away northwesterly and spreads its great cargo of ice and broken stone on the lowlands. From both Mount McKinley and Roosevelt Ridge there is a ceaseless train of avalanches thundering down steep slopes to Peters Glacier. East of Peters Glacier the main walls of Mount McKinley rise in a succession of overhanging glaciers and granite cliffs, with a general slope of about forty-five degrees, culminating in a saddle-shaped ridge about two miles long.

Mount McKinley, like most large mountains, presents a very different aspect from every point of view. From a mountain thirty-five miles northeast, looking across unnamed peaks twelve thousand feet high, we got a striking view of the great McKinley uplift. An almost constant stream of clouds swept over and around the mountain from the east, and a blue electric glow softened the rough outlines. Now and again we could see the summit, and from here it resembled very much the crown of a molar tooth. Four tubercles were distinctly visible; the saddles seen from the west formed two, and to the east were two rather higher and more distinct. These tubercles of this giant tooth are separated by large glaciers, whose frozen current pours down very steep slopes into Fidele Glacier. Apparently continuous with Mount McKinley, and extending northeasterly far beyond our position, there was a sharp, icy ridge, in which we saw several mountains over ten thousand feet high.

From the east and south the great peak resembled somewhat a beehive, and it gives a better impression of bigness than from the west and north, but the approaches from here are still unexplored. Two very large glaciers drain the eastern slope. Fidele Glacier, probably the largest of interior Alaska, takes the output of several small glaciers about the northern and eastern slopes; and then taking a northeastern course, it is joined by two large glaciers, after which it circles among unknown mountains to the Chulitna River, where its face is eight miles wide. Ruth Glacier, a somewhat smaller stream, begins among the amphitheatres about the southeastern slopes; and taking a tributary from Mount Foraker and others from the lesser mountains eastward, it also describes a



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MT. MC KINLEY REGION — ALASKA

Natural Scale 1 : 3500000

SCALE OF MILES

0 20 40 60 80 100 120

Glaciers ▬▬ ------ Dr. Cook's Route

semi-circular course, but southward to the Chulitna River. Between these two glaciers there is a wide belt of sharp mountains from five thousand to twelve thousand feet high, separated by deep cañons.

Mount McKinley offers a unique challenge to mountaineers, but its ascent will prove a tremendous task. It is the loftiest mountain in North America, the steepest mountain in the world, and the most frigid of all great mountains. Its slopes are weighted down with all the snow and ice that can possibly find a resting-place, but, unlike Mount St. Elias, the glaciation is not such as to offer a route over continuous ice. Every conceivable way is interrupted by overhanging glaciers of granite cliffs. The area of this mountain is far inland, in the heart of a most difficult and trackless country, making the transportation of men and supplies a very arduous task. The thick underbrush, the endless marshes, and the myriads of vicious mosquitoes bring to the traveller the troubles of the tropics; the necessity of fording and swimming icy streams, the almost perpetual cold rains, the camps in high altitudes on glaciers, in snows and violent storms, bring to the traveller all of the discomforts of the Arctic explorer; the very difficult slopes, combined with high altitude effects, add the troubles of the worst Alpine climbs. The prospective conqueror of America's culminating peak will be amply rewarded, but he must be prepared to withstand the tortures of the torrids, the discomforts of the North Pole seeker, combined with the hardships of the Matterhorn ascents multiplied many times.

SOUTHERN RUSSIA AND THE CAUCASUS MOUNTAINS.*

BY

EDMUND OTIS HOVEY.

Once in three years the geologists of the world meet to discuss questions of their science which concern all countries alike. These congresses began with one held in Paris in the year 1878 as the fulfillment of a plan proposed at the meeting of the American Association for the Advancement of Science at Buffalo, New York, in 1876. Other meetings of the Congress have been held in Bologna,

* Synopsis of a lecture delivered before the American Geographical Society, Tuesday, 19 April, 1904.

1881; Berlin, 1885; London, 1888; Washington, 1891, and Zürich, 1894. The seventh Congress was held at St. Petersburg in August, 1897, and was the occasion which enabled the speaker,* in company with many associates, to make an extended tour in Russia under exceptionally favourable circumstances. One of the most attractive and instructive features of each congress has been the excursions which have been offered before, during, and after the business sessions, for the purpose of affording visiting geologists an opportunity for getting a comprehensive view of the geology of the country in which the meeting is held. When it was known that the Congress was to meet in Russia, the first question which arose was, What will the Russians do to show us their mines and their geology? Most royally did the Tsar and his subjects reply to the query.

Custom-house and passport regulations were mollified for the benefit of members, and free passes calling for first-class transportation over all the railroads of the empire, for nearly four months, were enclosed with the certificates of membership. The geological excursions before the sessions offered opportunities for different parties to visit Finland, Esthonia, and the Ural Mountains; while afterwards the "Congressists" had the choice among routes covering all the most interesting portions of southern Russia in Europe—the Crimea, the Caucasus, Baku, and Transcaucasia, as far south as Mount Ararat, in Armenia, on the boundary line between Russia, Persia, and Turkey. With such an array of attractions in a country the interior of which is usually so difficult of access to the tourists it is small wonder that geologists all over the world turned their faces toward Russia in the summer of 1897, until the seventh International Geological Congress surpassed all its predecessors in point of attendance. After the Congress the unanimous feeling of the members in attendance was that every Russian, from the Tsar to the humblest peasant, had put forth his utmost effort to make the visitors welcome and to provide for their comfort and convenience. The American contingent, in particular, was most cordially received everywhere.

Russian national life may be said to have had its beginning during the fifth century of the Christian era at two centres—Kief, on the Dnieper River, and Novgorod the Great, on the Ilmen. Nine hundred years later Moscow became pre-eminent, and from the kingdom of Muscovy the Russians began to push out in all directions. They suffered many reverses from their hostile neigh-

* As the official delegate of the American Museum of Natural History.

bours, and for generations paid tribute to the Tartars who overran their country from the east. Not until the middle of the sixteenth century, under Ivan the Terrible, did Russia achieve entire independence of the Tartar hordes. Succeeding monarchs were busy consolidating their country, and incidentally adding to its territories by absorbing contiguous lands, but the idea of expansion by absorption did not take complete possession of rulers or people until the close of the seventeenth century, when Peter the Great ascended the throne.

From the reign of this remarkable Tsar onward the world has seen a wonderful development in the general civilization of Russia, and a continuity of purpose in the absorption of territory towards the east and southeast, until the undisputed sway of the Great White Tsar extends from Mount Ararat on the south to the Arctic Ocean, and from the Baltic Sea on the west to the Pacific. We have seen Merv, Samarkand, Tashkent, and the warlike provinces extending along the western slopes of the Tiân Shan Mountains become peaceful dependencies of St. Petersburg. It remains to be seen whether the present war with Japan will force Russia to loose her hold upon the rich province of Manchuria and abandon this much-needed outlet from Siberia to the Pacific Ocean. It is not my purpose, however, to discuss Russian history and diplomacy in the Far East. I propose to confine myself to some of the features of southern Russia-in-Europe, the Caucasus, and Trans-Caucasus, drawing my material, for the most part, from my own observations and experiences in connection with some of the excursions succeeding the stated sessions of the already-mentioned International Geological Congress.

Russia proper occupies most of the vast saucer which forms two-thirds of the continent of Europe. The rim of this saucer is indicated by the Ural Mountains on the east, the Caucasus and Carpathian Mountains on the south and southwest, and the Scandinavian Mountains towards the northwest. European Russia, which is two-thirds as large as the United States, supports a population one-half again as great as our own. Soil and climate, and the resulting industrial development of the people, vary greatly in the different parts of the country. In southern Russia one finds extensive flat lands stretching northward from the Black Sea and the Sea of Azov; towards the east these plains slope gently towards the Caspian, where they become desert areas.

The plains of the central and southwestern portion of the country are fertile, and raise more than enough grain for the consump-

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tion of the inhabitants; but the basin of the Donetz River is of supreme importance, on account of the mineral wealth therein contained. Here occur the only workable beds of coal in European Russia. Most of this valuable mineral is exploited by foreign companies working under Imperial concessions. Quicksilver is found here in quantities which make Russia the fourth in rank of countries producing that metal. The only mine, however, in operation is that of the English firm of A. Auerbach and Company, which is at Nikitovka, in the province of Ekaterinoslav. At Dekonskaïa, near Bakhmut, extensive salt deposits of Permian Age are in process of exploitation. One of the mines has its principal galleries in a bed of solid rock salt 117 feet in thickness, the bottom of which is 422 feet below the surface of the ground. In this mine there are 326 feet of granular and crystalline pure rock salt in seven beds between 305 and 764 feet underground. In 1896 the salt mines of the Bakhmut region had a production of 288,240 tons per annum, and were still increasing their output.

On leaving the Donetz basin, one traverses the vast flat plains left by the retreating Sea of Azov, and after a long, uninteresting ride is glad to see the snow-capped peaks of the Caucasus gradually approach. The Caucasus Mountains extend in almost unbroken line from the northwest to southeast, attaining an elevation considerably above that of the Alps; while several of the individual mountains, such as Elbruz, Koshtantau, Dykhtau, and Kazbek, rise far above the altitude of Mont Blanc.

The chief mineral spring area of Russia—what one may call the Saratoga of the country—centres about Piatigorsk and Kislovodsk, north of Mount Elbruz, and the region is much frequented for inward and outward application of the waters. In several districts here one finds ferruginous, alkaline, and acidulated carbonic springs which may be regarded as the final phase of once extensive volcanic activity.

Mount Elbruz, which is visible as a cloud upon the horizon during the latter part of the journey across the low plains bordering the Sea of Azov, is not in sight from the mineral water region; but a day's horseback ride through the mountains of Kislovodsk brings one to Mt. Bermamut, from which is obtained a famous view of the mountain. Mount Elbruz, the loftiest peak in Europe, 18,466 feet (5,630 m.) in height (Stieler), is an ancient volcano terminating in two peaks, in each of which there is a crater.

Koshtantau, 17,092 feet (5,211 m.), Dykhtau, 16,895 feet (5,151 m.), and other giants rise from the more ancient rocks of

the central Caucasus. Many glaciers are to be found in this area, the most noteworthy of which, perhaps, are the Karagom and the Bezingi. The Caucasus Mountains long formed a practically impassable barrier to advance by land from Asia into Europe. The northern ranges of the mountain system have a more gentle inclination toward the north than they have toward the south; while the contrary is true of the southern ranges. The general slope of the system as a whole, north of the watershed, is steeper than that of the portion south of the crest. The watershed forming the boundary between Europe and Asia is sometimes a narrow or even sharp ridge, and at other times a more or less extensive plain, which, in places, is swampy. The principal geological researches upon the great complex, which, indeed, extends as far south as Erivan, have been made by Abich, Favre, Sorokin, Simonovitch, Karakasch, Inostranzeff, Fournier, and Loewinson-Lessing*; while the English mountaineer Freshfield has given us, in his work "The Exploration of the Caucasus," the best and most comprehensive popular description of the region.

Abich considered the whole Caucasus system as an enormous anticlinal, overthrown toward the north, but the investigations of the later workers have modified this simple conception in great degree. Palæozoic and Liassic schists constitute the fundamental great anticlinal. This has been overthrown and compressed. It includes the granitic central massif, together with the gneisses and mica schists, and a whole system of beds and dikes of diabase, porphyrite, and diorite. The whole is pierced and covered with enormous beds of recent andesitic lavas and with volcanoes more or less well preserved. Somewhat strikingly-marked unconformities exist between the Lias and the Upper Jurassic, between the latter and the Cretaceous, and between the Cretaceous and the Tertiary strata. In general, all the beds dip toward the north-northwest or the north-northeast; but they are not isoclinal, inasmuch as the angles of dip vary.

In addition to the principal anticlinal, there are several minor folds on both slopes of the system; and the rocks indicate that there have been two directions of orogenic movement—the more ancient toward the north-northwest, and the more recent toward the north-northeast. The several minor longitudinal valleys of the

* The last-named author has given in the "Guide des Excursions du VII Cong. Géol. International," Part XXII, a summary account of the central Caucasus Mountains, and the Georgian Military Road in particular, which has been freely consulted in the preparation of these pages.

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northern slope are developments along broken-down anticlinal axes. The elevation of the chain began after Liassic time, and orogenic movements took place in the Jurassic, in the Cretaceous, and in the Miocene. That the several movements have not ceased is shown by the occurrence of frequent earthquake shocks over large areas.

The ethnography of the Caucasus presents a diversity which is full of interest, and which has not been completely deciphered. It has been contended that the skulls found at Mtzkhet, Delijan, and elsewhere indicate that the ancient population of the Caucasus was of dolichocephalic development, although the present native inhabitants belong to the brachycephalic type.

One finds in the region an almost endless array of languages and dialects, since this seems to have been a general clearing-house for the wandering peoples of Europe and Asia. Christians, Mussulmans and pagans, Aryans, Semites and Mongolians, are to be found here in greater or less degree, presenting a wonderful variety of culture and speaking many diverse tongues. Although the languages of the Caucasus are not as yet entirely investigated, they may be grouped as follows (Loewinson-Lessing):

Ural-Altai,
Aryan,
Kartvelien or Iberian (which is the Caucasus group properly so-called),
The Western Mountain,
The Eastern Mountain.

Aside from the Russians and from the colony of Germans located near Tiflis, one encounters in traversing the Georgian Military Road at least eight tribes:

The Cossacks of the Térek (Russians and Little Russians),
The Osses or Ossetes (Christians and Mussulmans),
The Inguches, who are relatives of the Tscherkesses Adighe (Mussulmans),
The Georgians or Kartveliens (Christians),
The Mokheviens (Georgians),
The Pchaves (Georgians),
The Khevsurs (a mountain tribe of pseudo-Christian character speaking the Georgian language),
The Armenians.

From Vladikavkaz to Kobi, the Georgian Military Road, which is practically the only route across the mountains, follows the valley of the Térek, piercing the lateral chain for a distance of seven and

one-half miles by the famous Dariel (or Darial) gorge. At Kobi the route leaves the valley of the Térek, ascends the gorge of the Baidarka, traverses the Krestovaïa Gora, or Pass of the Cross, 8,015 feet (2,443 m.), and descends rapidly to Mléty, a little hamlet situated upon the banks of the White Aragva. From Mléty the route continues along the White Aragva as far as Ananur, where it leaves the stream-bed and climbs the heights of Duchet. Before Tsilkani is reached the road comes down again to the river, which has now become a large stream through the influx of the Black Aragva. From this point the valley widens and the road advances by easy grades to Mtzkhet at the junction of the Aragva with the Kura, where it crosses the latter stream and follows its right bank down to Tiflis. Different points along the route and in its vicinity have been celebrated in Russian poetry and song, particularly by Puschkin and Lermontoff.

The supposition that the Dariel gorge served for the passage of ancient Asiatic peoples coming to overwhelm Europe seems to be without sufficient foundation. From time immemorial this has been the route of the mountain tribes which periodically overran Georgia, and which completely dominated the defile before the establishment of the Russian power. According to the Georgian chroniclers, the first forts of the Dariel were located in the second century after Christ, and the bold cliffs of the gorge have witnessed a long succession of wars, battles, and massacres. The route was known in very ancient times, if we are to believe those who recognize in this pass the "Porta Caspiæ" described by Procopius, the author of the history of the wars waged by the Romans against the Persians. There seems to be no doubt that the "Porta Caucasiæ" of Iberia, mentioned by Pliny in his "Historia Naturalis," was the Dariel gorge.

In the Georgian chronicles several different names are applied to the gorge in question, but it is most frequently called the Dariel or Darial—a name which is thought to have had its origin in the Persian "dar" or "der," which signifies "gate" or "door." Dar-i-Allan would mean the Allan Gate, or the Gate of the Allans. The first Russian troops to pass through the gorge were sent in 1769 to defend Georgia against the Turks. The first bridges over the Térek were built in 1809. The region was given over to Russia by Turkey by the Treaty of Adrianople in 1829, but the last independent mountain tribe did not surrender to the forces of the Tsar until 1864. The thirty-five years during which the struggle for the Caucasus continued witnessed many prodigies of

valour by the invading Cossacks and by the brave defenders of home and liberty in the mountains. The name of the Mohammedan leader Schamyl will be immortal in the annals of the wild tribes of Daghestan for the success with which he waged the unequal contest against Russia for thirty years.

Along the Georgian Military Road the most prominent mountain is that known to the civilized world as Kazbek—a name which was applied to the peak at the beginning of the nineteenth century by the Russians themselves in honour of the chief or "moourave" Kazbek, who lived in the village of Stepan-Tzminda, and served as an intermediary between Russia and Georgia before its annexation. The Georgian name for the mountain is Mkinvari (snowy or icy), or Kirvan-Tservi. The Ossetes use the names Urs-Goh (the White Mountain), Chresté-Tsub (the Mountain of Christ), and others. The native inhabitants consider the peak of Kazbek to be entirely inaccessible—an opinion from which they cannot be dissuaded. The first attempt to ascend the mountain was made by Parrot in 1811; the second by Colenati in 1844. Success was reserved for Freshfield, Moore, and Tucker, who, in 1868, were the first to set foot upon the actual summit, which is 16,541 feet (5,043 m.) above the level of the Black Sea. About twenty years later a successful ascent was made by the Russian topographer Pastukhoff.

The Greek poet Æschylus is supposed to refer to some of the cliffs of Kazbek in his tragedy "Prometheus Bound," and many other legendary and historical associations cluster about the forbidding defiles of the great mountain mass. Opposite the station of Kazbek and the glacier Orotsveri is the ancient church Tzminda-Sameb, which was once, perhaps, a monastery. Popular tradition assigns the construction of this church to Queen Tamara, a favourite sovereign of the Georgians, who reigned in the eleventh century. Between the Abanot and Orotsveri glaciers there may he seen, at an altitude of about 11,500 feet above the sea, the remains of ruins, which seem to confirm the popular legend of an inaccessible cloister called Bétlem, containing wonderful riches.

Caverns, too, are known in the sides of the mountain, some of which have served as habitations for anchorites. One of the caverns, whose exact position can be known only to the very elect, is thought by the natives to contain the tent of Abraham and the cradle of Christ. Between Balta and Lars are the ruins of several ancient forts; while in the Dariel Gorge one may see the ruins of a castle ascribed to Queen Tamara.

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The pass itself is known as the Krestovaïa-Gora, or Mount of the Cross, on account of a stone cross which was erected in 1824 to designate the summit of the pass, which is the watershed between Europe and Asia. The cross stands three hundred yards east of the road, on the spot formerly occupied by the cross said to have been placed there eight hundred years ago by the same Tamara.

Mtzkhet is considered by its native inhabitants to be the oldest city in the world. According to tradition, it was founded by Mtzkhetos, the son of Kartlos, who was of the fifth generation after Noah, and was the originator of the Georgian people. The city was the capital of Georgia until 469 A.D., when the seat of government was transferred to Tiflis. The principal building in Mtzkhet is the Byzantine cathedral, built early in the fifteenth century by Alexander upon the site of the church which had been erected 1,100 years before by King Miriam. Miriam's church was destroyed by Tamerlane during his invasion of Georgia, and the present is the fourth edifice which has occupied the place. North of the cathedral there were discovered, in 1871, tombs arranged in two stories, one above the other. The lower range contained objects of the Iron Age belonging to the tenth or eleventh century before the Christian era. Those of the upper range contained Roman money of the time of the Emperor Augustus. The skulls found in the tombs were dolichocephalic in type. Many valuable archæological relics have been found throughout the Caucasus region, and a large collection of such objects is preserved at the Ethnographic Museum in Tiflis.

In early historic times the great plain lying between the Caucasus and the Anti-Caucasus mountains was divided among three kingdoms: Colchis in the west, bordering on the Black Sea; Albania in the east, bordering on the Caspian Sea; and Iberia in the middle. Of these, Iberia was by far the most powerful, since she had the most fertile land, and had control of the only practicable route northward across the Caucasus Mountains, and of the best one southward toward Persia.

The people of the middle kingdom successfully withstood the onslaughts of the Medes and the Persians, but succumbed to the armies of Rome under Pompey, and from his time remained a part of the Roman empire until its dissolution. After the division of the empire, Iberia was long a scene of contest between the Eastern Empire and the Persians. In the eighth century the dynasty of the Bagratidæ ascended the throne of the country, which had now

come to be known as Georgia, and maintained itself until the end of the eighteenth century, when Heraclius placed his country under the protection of Russia, to prevent its falling before a powerful Persian force. In 1801, George XIII abdicated in favour of Tsar Alexander I, and Georgia became a part of the Russian empire.

Tiflis, now a city of more than ninety thousand inhabitants, was the capital of the kingdom of Georgia from the year 469 onward, and has been the capital of the province of Trans-Caucasia since Russian domination began. The city is picturesquely situated on both sides of the River Kura, and is divided into three sections. The Georgian quarter, on the left bank of the tumultuous stream, is characterized by dirt and lack of thrift; the Persian and Armenian quarter is on the right bank, and is a busy hive of industry, which leaves much to be desired, however, in the way of cleanliness; the modern Russian quarter lies on the high ground forming the second terrace of the Kura on the south side of the river, and is cleanly and attractive in appearance. The cosmopolitan character of Tiflis is indicated by the fact that seventy languages may be heard spoken in its streets (Brugsch). At present Tiflis is not a fortified town, although extensive arsenals and barracks have been established in the northern part of the city.

On a high ridge rising abruptly from the right bank of the river are the ruins of the ancient fortress which protected the city when it was the capital of Georgia. The portion of the city which arouses the most interest in the foreign visitors is the so-called "Bazaar" of the Persian–Armenian quarter. Here the streets are distressingly narrow, and crooked little lanes and byways ramify in all directions among the low wooden houses. The main specialty of the artisans is the decoration of silver with a kind of black enamel in intricate designs. Everything is done by hand with the simplest tools imaginable. The forge is a portable affair, made from a single block of stone, with a shallow depression in the top to hold the coals and a hole drilled in the bottom thereof downward to connect with the pipe from the bellows. The latter contrivance is merely a bag of soft goat's skin, which opens at the top like an ordinary traveller's handbag. The forge-tender is a boy, who dexterously opens the bellows and fills it with air with one upward motion of his hand and then closes it and forces the contained air into the fire of the forge with a single downward motion. A considerable portion of two streets in the "Bazaar" is devoted to the shops of the silversmiths, and one can see sword and dagger

scabbards and handles, cups, thimbles, cuff-buttons, brooches, and many other articles of adornment or utility in all stages of manufacture.

The western kingdom, the ancient Colchis, lies upon the Black Sea slopes of the transverse ridge which connects the Caucasus with the Anti-Caucasus Mountains. This transverse ridge or range, which is known as the Suram Mountains, consists of granitic rocks, and nowhere is more than 3,000 feet in elevation above the sea. Its crest forms the watershed between the Rion River on the west and the Kura River on the east. The chief city of Colchis was Cotatis—a name which the vicissitudes of time have changed to Kutaïs. Hither in mythological times came Jason and his crew of Argonauts in quest of the Golden Fleece. An explanation of this legend, which has long been current, is that the fleece received its name from having been spread on the bottom of the river to catch the tiny particles of gold brought down by the stream from the mountains. Similar processes of winning gold are known in many places; but little, if any, gold is now known to occur in the bed of the Rion River, which is the River Phasis of the ancient Greeks and the Argonautic expedition.

Kutaïs is now an important place of about 23,000 inhabitants, and is a good starting-point for expeditions into the western Caucasus. The high valleys of this part of the Caucasus system are broader and more fertile than those of the northern slopes. This has tended toward a greater feeling of independence on the part of the tribes inhabiting them—a fact that is strikingly illustrated in the case of the Svanetians, who pay but weak allegiance to the Russian power.

At Tkvibuli, a few miles up the valley from Kutaïs, occur the only coal mines that have been opened in the Caucasus region. The coal-bearing beds are of Jurassic Age, and the coal is not of as good quality as is that which is produced in the Donetz basin. It is of the lignite type, and is pressed into briquettes for distribution and use. Not far from Kutaïs occur important beds of manganese ore. Time and space do not permit further discussion of the interesting environs of Kutaïs and the archaic customs of the inhabitants; the architecturally perfect monastery of Ghelati; the ancient ruins of the little village of Suram, on the cross range already mentioned; of Borjom, one of the favourite resorts of the Russian nobility, and of other places of more or less historic interest or beauty, or of peculiar physiographic development in this great region.

At the extreme southeastern end of the Caucasus Mountains, upon the southern slopes of the peninsula of Apsheron, 345 miles east of Tiflis, lies Baku, which is the ancient Getara. This was the chief city of the old kingdom of Albania, and was for a long time included in Persia, though it has now been a Russian city for more than three-quarters of a century. Baku is by far the most important place on the Caspian Sea, from a commercial point of view; but its chief interest to the world outside of Russia lies in the fact that it is so near the greatest petroleum region in the world. Up to thirty years ago the city scarcely exceeded twenty-seven thousand in population; but from the time that the Nobel Brothers secured the imperial concessions which enabled them to consolidate the oil business of the region the city has seen a marvellous growth, and in 1896 its population was 115,000.

The peninsula of Apsheron is underlain by oil-bearing strata of Tertiary Age. According to A. Konchin,* the geological section of the peninsula is, in descending order:

I.—The Post-Tertiary deposits of the Caspian Sea: Loess, clays, gravel, conglomerate, and shell-bearing littoral deposits, all mingled with ejections of mud and oxidized petroleum products from the ancient and modern mud volcanoes.

II.—Deposits of Tertiary Age:

(3) Shale, limestones, sands, clays, and sandstone of the Upper Aralo-Caspian (Neocene).

(2) Oil-bearing sands (with or without water), sandstones, and clays of the Oligocene.

(1) Marls and shales, containing fish remains of the Upper Eocene.

The oil-bearing Oligocene sands and sandstones are associated with clays and marls of the same age, which likewise contain some petroleum, but in too small amounts for productive exploitation. The Oligocene beds form a gentle anticline, the axis of which is inclined at a low angle from the northwest toward the southeast. The oil-bearing strata are nearest the surface at Balakhany, about eight miles north of Baku, where the total thickness of the petroliferous beds is from 350 to 870 feet. This thickness increases to 1,750 feet at Ramany and Sabountchy, two miles southeast of Balakhany.

The productive beds are separated from one another by layers

* "Guide des Excursions du VII Congrès Géologique International," XXIV.

of clay, which are impermeable to both gas and oil. Consequently, the wells are sunk from one stratum to another as fast as the pressure in the upper beds lessens and the supply of oil diminishes. The wells in the Balakhany–Sabountchy district vary from 500 to 1,500 feet in depth. The total area of this remarkable oil field is scarcely more than six square miles.

About three and one-half miles south of Baku there is a small oil field, known as Bibi-Eibat, the character and structure of which are exactly like that of the one already mentioned, but the productive beds lie nearer the surface. From these two contracted areas 80,540,045 barrels of crude oil were produced in 1902, which was almost as much as was produced in the whole of the United States. The value of the Russian oil, however, is much less than that produced in the United States, because it lacks the paraffin and other valuable by-products which characterize the oils from the Appalachian, Ohio, and Indiana fields. Owing to various causes the production for 1903 in the Baku fields decreased by 7% from that for 1902. Spouting wells are a picturesque characteristic of the Apsheron oil fields, about 23% of the oil coming to the surface in this manner. The inspection of the great refineries of the Nobel Brothers, the Rothschilds, and others is an interesting feature of a visit to Baku and its vicinity.

The region of the oil fields contains many vents, from which natural gas issues with more or less force. Near Bibi-Eibat the gas comes up through the waters of the Caspian Sea, and a picturesque effect is produced at night by igniting the bubbles as they rise. Near Balakhany the gas throws up water and mud, and has formed the mud volcano known as Bog-Boga. At Surakhany, southeast of Balakhany and just beyond the edge of the productive oil field, natural gas has issued from the ground copiously for centuries; and here are to be seen the abandoned temples of the Parsi Fire-Worshippers—since this was the centre of that cult—and the objective point of countless pilgrimages from Persia to the shrines of the eternal fires. Not until 1880 did this worship cease, when, by the order of the Tsar, the last degraded priests were expelled from the country. Now the gas issuing from the ground is piped to the neighbouring village and put to practical use for heat and light. The contest between Oriental mysticism and the practical ideas of the Western civilization has resulted in the exclusion of the former and the exploitation of the resources of nature for the benefit of mankind.

The journey southward from the valley of the Kura across the

Anti-Caucasus range of mountains presents many features of the greatest interest on account of their contrast to the mountains of the main Caucasus range. Now there is a railroad southward from Tiflis to Alexandropol and Kars; but the old post-road from Akstafa, a little station sixty miles east of Tiflis, presents much of scenic and geologic interest, and was the route followed by the author when he visited Mount Ararat.

From Akstafa the post-road crosses the "Long Valley" of the Kura and ascends the winding valley of the Akstafa River as far as Delijan. After leaving the Quaternary deposits of the immediate Kura valley white and blackish limestones of late Cretaceous Age are encountered, which dip gently toward the northeast. Twelve miles from the plain of the Kura these limestones show insignificant folds for a half-mile and then take a definite inclination toward the south. Piercing the limestones, and associated with them, there are eruptive rocks of rather basic character, while some of the limestone beds rest upon deposits of volcanic tuff.

At Delijan, fifty miles from Akstafa, the road to Erivan leaves the bed of the river to cross the pass of Tchibukhly (7,421 feet). To the east lies the rugged Karabagh country, where brigandage is still rife. To the west is the somewhat more peaceful valley of ancient Georgia. The pass is broad and undulating, and slopes gently toward the south, where the road soon comes out upon the shores of the beautiful Lake Goktchaï, or Sévanga (called Lychnitis in ancient writings), which it follows as far as the village of Jélénovka. This lake, which is fifty miles long and twenty-four miles wide, is one of the loftiest bodies of water in the world, its surface being 6,340 feet above the sea. The lake is remarkable for its periodic variations in altitude, and is noted for the beauty of scenery, due to the surrounding ancient volcanoes and the promontories of volcanic rock projecting into it.

From this point onward the route traverses the elevated volcanic plateau of Armenia. The general view of the plateau, with its numerous volcanoes, which is obtained just as the road begins to descend into the valley of the Araxes River, is impressive. Toward the west the view is bounded by the colossal Alagheuz (14,279 feet), on the east by Agdagh (10,758 feet), and Agmangan (11,897 feet), while on the south lie the incomparable mountains of Ararat, culminating in the great Ararat itself, more than sixty miles away.

Armenia, like Poland, has had a checkered history, which has resulted in her partition among three more powerful neighbours.

In 1828 the treaty of Turkmanchai secured the northeastern part of the kingdom, with the capital, Erivan, to Russia. The remainder of the country had already been divided between Persia and Turkey. Erivan, now the seat of government of the Russian province of Armenia, is interesting on account of its industries and the remains of ancient grandeur.

Mount Ararat is the result of complex volcanic activity dating from the Cretaceous and Tertiary times, which ended in the production of the Great Ararat, now 17,092 feet in altitude, and the Little Ararat, 12,989 feet. The peaks are about seven miles apart as the crow flies. Eruptions ceased so long ago that the semblance of a summit crater has been almost entirely removed from the Little Ararat; while the upper four thousand feet of the Great Ararat are covered with eternal snow, concealing any evidence that there might otherwise be of ancient craters. The lavas of the Ararats belong to the rocks known as andesites—a class of medium acidity.

Rising as these mountains do in an isolated position from a plain scarcely three thousand feet above the sea, the grandeur due to their altitude has its full effect. They dominate the region for scores of miles in every direction, and when one views them in the light of the rising or the setting sun, under the glare of mid-day or by the light of the full moon, he does not wonder at the numerous legends which have grown up during the centuries in the minds of the shepherd tribes which inhabit the country.

NOTES ON THE U. S. GEOLOGICAL SURVEY.

Twenty-fourth Annual Report, 302 pp., 1902–1903.—The prompt issue of this report adds to its interest and value. The great additions to resources for the reclamation of the arid lands and for general hydrography receive suitable attention, a hydrographic branch having been organized under the direction of Mr. F. H. Newell. The appropriation for the year was $1,377,470. Investigations in Alaska are noticed with fulness commensurate with recent expansion of work in that field.

In the topographic branch co-operation was effected with twelve States, New York leading in the appropriations with the sum of $22,000, and 31,000 square miles, or nearly two-thirds of the State, had been covered to April 30, 1903. The report contains

biographic sketches of John Wesley Powell and Richard Urquhart Goode, with portrait of the former.

THE COAL RESOURCES OF THE YUKON, ALASKA, BY ARTHUR J. COLLIER, FORMS BULLETIN No. 218.—It gives the results of explorations in 1902. The Yukon was followed from Dawson to the sea, and the economic facts are delineated upon a map covering the Territory from the international boundary to Bering Sea. The conclusions from large collections of fossils are yet to be published.

Coal of commercial importance is confined to two geological horizons—the upper Cretaceous and the Kenai series of the upper Eocene. Small basins of the latter age, representing freshwater deposition, and bearing lignitic coal, are found above the mouth of the Tenana, at Rampart, and northward. The Cretaceous coals occur extensively to the southwest along the lower Yukon. These are of better quality than the Eocene, and belong to the bituminous class.

The Yukon steamers chiefly use wood; but as there is a vast extent of navigable waters, the coal will have growing importance for this purpose, as well as in the various mining and commercial settlements. The average price paid for the coal hitherto mined has been about $14 per ton. The deposits will suffice for local use, but their poor quality, small extent, and remoteness render mining for export impracticable.

Other recent bulletins are: The Ore Deposits of Tonopa, Nevada, by J. E. Spurr, No. 219; Mineral Analysis, 1880 to 1903, by F. W. Clarke, No. 220; Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the year 1902, by F. B. Weeks, No. 221; and Catalogue and Index of the Publications of the Hayden, King, Powell and Wheeler Surveys, No. 222.

THE MENOMINEE IRON-BEARING DISTRICT OF MICHIGAN, BY W. S. BAYLEY, MONOGRAPH XLVI.—This is the sixth and last volume on the iron districts about Lake Superior, to be followed by a closing monograph on the general geology of the entire region. Following the outline of the monograph are a bibliography and abstract of the literature (84 pp.) and a brief chapter on the physiography. The detailed discussion of the geology and the ore deposits follows, closing with a short review of the geological history. Two interesting plates (after Gresley) show organic markings in the Lake Superior iron ores, chiefly tracks and doubtful plant remains.

PRELIMINARY REPORT ON THE GEOLOGY AND WATER RESOURCES OF NEBRASKA WEST OF THE ONE HUNDRED AND THIRD MERIDIAN, BY N. H. DARTON, PROFESSIONAL PAPER, No. 17.—This has value for the geologist, the geographer, and for the prospective resident. The district is a belt about 60 miles wide along the Wyoming boundary. The report includes contour, relief, and geological maps of the entire State. There is also a review of the general geology of the State, and of this area in detail. This is followed by an account of the water horizons, springs and surface streams, and a map showing distribution of springs and underground waters. An irrigation map of the Platte valley in this area shows canals, with present areas of irrigation and others considered practicable. We find a diagram of the rainfall, and also a map showing the distribution of the forest lands.

A. P. B.

THE ZKARA, A CHRISTIAN TRIBE IN MOROCCO.

If in a remote corner of Italy a remnant of the Goths were discovered, speaking the language of Ulfilas, it would hardly create greater surprise than the news that a Christian tribe of natives, called Zkara, has been found in Morocco. Yet the details seem to leave hardly any doubt of the fact. They are set forth in the Bulletin Trimestriel de Géographie et d'Archéologie d'Oran, Tome XXIII, fasc. XCVII, October–December, 1903, by the discoverer, M. Auguste Mouliéras, Professor of Arabic at Oran. The remoteness of various parts of Morocco from the paths of invasion and commerce had long ago suggested to the author that some of these sequestered nooks might shelter remnants of ancient populations not submerged by the tide of Islam. After years of inquiry he was at length rewarded by a definite clue, and finally succeeded in interviewing some individuals of the tribe itself. His principal informant is thus described: "Height 1.70 m., nose aquiline, *eyes blue*, beard thin, expression distrustful in the extreme, with the absorbed and crushed appearance of those long tormented by misery."

The country of the Zkara is situated some 15 miles W. S.W. of the Moroccan town of Oujda*, quite close to the Algerian frontier, and consists, for the most part, of a high mountain mass called Jbel Zkara (Mountain of the Zkara), constituting a spindle-shaped island

*Oujda in the French spelling. Ujda is given in Century Atlas, 25 miles from the Mediterranean.

between two deserts. To this natural citadel the tribe retreat in time of danger; at other times they spread out over the lowlands, occupying an area of some 2,150 square miles, almost exactly the size of the State of Delaware (2,120 sq. m.). The mountains are well watered, and irrigation enables the natives to cultivate fig trees, wheat, and barley. They have some 1,600 tents and 3 villages, owning 160,000 sheep, 80,000 goats, 20,000 cattle, 5,000 mules, 4,000 saddle horses, 8,000 mares, 5–6,000 donkeys. They can put in the field 3,500 warriors, nearly all armed with Remingtons, bought at the Spanish port of Melilla, some 60 miles distant. Thus the tribe probably numbers some 20,000 souls. They are practically independent of the Government of Fez, being among the supporters of the pretender Bou H'emara.

"Rana N'çara!" (We are Christians!) one of them whispered to the author in a moment of absolute confidence. However, the details regarding their beliefs render it doubtful whether any Christian denomination would receive them in fellowship. Their claim that they are descendants of the Romans seems to rest on even more flimsy support. In appearance and language they do not differ from their neighbours the Zenetes—a Berber tribe belonging to a peculiar Mussulman sect and inhabiting the triangle defined by the Algerian frontier, the Mediterranean, and a line between Melilla and Figuig. The immediate neighbours of the Zkara call them Kouffar, N'çara (infidels, Christians); at a little distance away no one suspects that they are not Moslems. However, they know no more of Jesus and the Bible than of Mohammed and the Koran. They eat pork and animals that have died a natural death, but they will not eat food prepared by Mohammedans or use a spoon that has once been in the mouth of a Mohammedan; hence they always carry their own spoons. They must not wear footgear that has been worn by Mohammedans; hence, when they enter Mussulman houses they do not leave their shoes at the door, but put them in a sack, lest some Moslem trickster, by putting his unclean feet in them, should render them unfit for the owner's use and oblige him to cut them to pieces. They marry only among themselves; their women commit suicide if they fall into the hands of Mussulmans. They do not pray or fast; they never enter mosques or sanctuaries, as travellers generally do in Moslem countries. Some young men of the tribe having gone to Fez to make their "studies" became converted to Islam, and tried, on returning, to make proselytes. They were promptly banished.

Not only do the Zkara not believe in the divine mission of Mohammed, but they profess a positive contempt and detestation of him, disliking even to pronounce his name. Though some of them bear such names as Mh'ammed, Mouh', Mouh'and — evidently Berber alterations of the word Mohammed—they deny that these have anything to do with the prophet's name. Their most common names are, for men: Aïsa (Jesus), Amor, Moussa (Moses), Ali, Doudouh', Belkassem, Abdallah (servant of God); for women: Rah'ma, Fat'ma, Rabh'a, Mariem (Mary), Aïcha. These sound Mohammedan enough, but it is suspected that they are simply used in the presence of Mohammedans to disarm suspicion; while among themselves the Zkara use names of their own, just as among the crypto-Christians of Pontus the man who on the market-place is called Ibrahim or Hassan becomes Athanasius or Polycrates as soon as he enters his own door. The Zkara despise the Mohammedans for erecting monuments to the memory of "saints." If victorious over a Mussulman tribe, they at once seize the valuables accumulated in mosques, chapels, and sanctuaries. To the reproaches of the outraged believers they reply: "Wealth can do no good to the dead; it had better be used to relieve the misery of the living."

Death, to them, ends all. No mortal soul, no last judgment, no paradise, no purgatory, no hell. If you ask whether there is a God, they will answer yes; they admit that the universe was created by a superior being, to whom they give the name Allah, borrowed from their neighbours during centuries of intercourse, but they seem to have no definite notion regarding the nature of that being. They rarely pray, believing that God does not change his own laws. Their practice of monogamy certainly points to Christian antecedents, but they know nothing of apostles or saints. They repudiate all affiliation with the Jews. Their most distinctly religious peculiarities are, first, their profound veneration for their priests, called Rousma—a word not used by Mussulmans to designate priests, though probably derived from an Arabic root; and, secondly, the mystical influence exercised over them by the descendants of the celebrated Moroccan saint Sidi-Ah'med ben Youssef.

Judging from the account thus far published (to be continued), we have have here a case parallel to those encountered in various corners of Asia Minor and Syria, where small tribes of mountaineers (Druses, Kizilbashes, etc.) have preserved religious notions and practices antedating not only Mohammedanism but even Christianity. From the Christianization of North Africa (about 400

A.D.) to its Islamization (about 700) there is an interval of only 300 years. Considering that Lithuania, surrounded by Christians for several centuries, accepted Christianity only about 1400, and that remnants of heathenism are said to have existed in England even at the time of the Norman invasion, it may be readily surmised that the Christianity of many Berber tribes had taken no deep root when Islam came to supplant it. It is probable, therefore, that the religion of the Zkara represents a succession of strata—pre-Christian, Christian, and Mohammedan—indistinguishable to the natives themselves. If such a survival was possible only 25 miles from the seaboard it is more than probable that others will be found in the inland fastnesses.

This ethnologic discovery may have a very practical political bearing, which the author does not hesitate to point out. At the moment when Europe has apparently consented to the annexation of Morocco by France nothing could be more convenient than the discovery of a "Christian" tribe occupying the very door of Morocco, intensely hostile to its Mohammedan neighbours, but decidedly friendly to France. Evidently this interesting tribe needs "protection," and may thus afford a convenient avenue to the conquest of Morocco—a consummation devoutly to be wished.

S.

CHAILLÉ-LONG'S WORK ON THE NILE.

(WITH A MAP.*)

To the Editor of the BULLETIN,
American Geographical Society.

BALTIMORE, May 18, 1904.

General Charles George Gordon, then Lieut.-Col. of R. E. of the British army, was appointed by Ismaïl Pacha Khédive, in 1874, Governor-General of the Egyptian Equatorial Provinces of the Soudan. An American officer, since 1869 Lt.-Col. of the Egyptian staff (Chief of Sections, Military Correspondence, Law, and Inspection), the writer, was designated by the Khédive to accompany Gordon as chief of staff and commander of the Soudanieh troops. He was instructed by the Khédive to make a treaty with M'Tésa, King of Uganda. This treaty, promptly executed at the capital of Uganda, July 19, 1874,† was communicated to the Egyptian Govern-

* Chaillé-Long discovered Lake Ibrahim in August, 1874. The date 1875 in Ravenstein's map is an error.

† Central Africa: Naked Truths of Naked People, London, 1876, pp. 316–318.

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BULLETIN OF THE AMERICAN GEOGRAPHICAL SOCIETY, 1904.

THE NILE, FROM URONDOGANI TO MRULI, FIRST EXPLO

From Sheet 8 of E. G. Ravenstein's map of East Equatorial Africa, published u
London, E. Stanford, 1882.

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IRST EXPLORED BY CHAILLÉ-LONG IN 1874.

a, published under authority of the Royal Geographical Society,
anford, 1882.

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ment, which made it the basis of a diplomatic note* to the Powers formally announcing the annexation of the entire Nile basin to Egypt.

The diplomatic mission accomplished, the writer determined to demonstrate the still unknown problem of the Nile sources. The blank in the Nile from Urondogani† on the Victoria Nile to M'ruli, Foueira, and Lake Albert, had given rise to much discussion among geographers, among whom Capt. Burton, Dr. Beke, and others.

Having executed a reconnaissance upon the Lake Victoria N'yanza on 14th, 15th, and 16th of July, the writer returned to the capital, where, the treaty between the Khédive and King being signed on the 19th, he bade the King adieu, and, escorted by 500 warriors, marched on the 20th towards the Nile. He quitted Urondogani on the Victoria Nile (whence Speke had been driven ‡ away in July, 1862) on the 5th of August in bark boats, his party consisting of himself, two soldiers, and five servants. The escort of Uganda

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* Publications of the General Staff, Cairo, 1877; Gen. Stone, Itinerary Lt.-Col. Long, p. 62.

† In G. B. Hill's book *Colonel Gordon in Central Africa, London, 1881*, is a quotation from Gordon: "It was contended that the Nile did not flow out of Lake Victoria and thence through Lake Albert," etc. (*note, p. 177*).

‡ Captain Speke, in his book, avows that he was driven from the Nile at Urondogani by the hostile Ugogos, and proceeded thence by the land route to M'ruli and Karuma Falls.

Sir Samuel Baker says, in *The Albert Nyanza, Vol. I, page 97, London, 1867*:

"On meeting [Speke and Grant at Gondokoro] I had considered my expedition as terminated by having met them, and by their having accomplished the discovery of the Nile source, but upon my congratulating them . . . Speke and Grant, with characteristic candour and generosity, gave me a map of their route, showing that they had been unable to complete the actual exploration of the Nile, and that a most important portion still remained to be determined."

Keith Johnston: *Africa, London, 1878*, page 322, says:

"After the discovery in July, 1862, of the Ripon Falls, where the river overflows from the N'Yanza by a descent of 12 feet between protruding rocks of gneiss, Captain Speke followed the *Somerset*, as he then named it, downward in its northerly course for 35 miles to *Urondogani*, but there was obliged to leave it and turn *northwestward* to the country of Unyoro; he did not see the river again 'till Mrooli, the capital of Unyoro, had been passed, so that an extent of about sixty miles remained unexplored.

"It was not until 1874, when Colonel Long made a perilous canoe voyage down the river from Urondogani to M'rooli, that the gap which had been left in the river's course was filled up, and all possible doubt as to its being the true head stream of the Nile cleared away . . .

"North and west of the Victoria N'Yanza . . . lies the land of Uganda, where King M'Tésa holds court not far from the lake. Between Uganda and the northern portion of the Albert Lake is the country of Unyoro. On both of these states fresh light has been thrown by the Egyptian expedition under Colonel Long in 1874, and by Colonel Gordon's more recent explorations."

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warriors, one servant and horse were sent forward by the land route. The exploring party in boats was armed with two Snider rifles and one elephant gun, with ample ammunition, which had been carefully preserved for this emergency. Assailed by storms that set in the afternoon of each day, and raged with fury all night, it was impossible to use instruments or measure distance. The banks of the river were lined with papyrus, that rendered landing difficult; and what with exposure to the pitiless cold rain at night, the hot sun of the day was almost insupportable. With insufficient food, consisting of bananas and a few beans, with no medicine to combat the fevers that attacked them, the misery suffered may be imagined but not described.

In his volume* *Central Africa*, the author says:

At midday (on the 11th) we passed the mountain (Gebel M'Tingi) seen in the distance the day before, and shortly after, as if by magic, we entered a sheet of water in which the river lost itself; and in vain I looked for the opposite shore, to be seen only from the river we had just left. Stretching away to the eastward, a scarcely visible line seemed to indicate land, certainly twenty miles away. Was this the basin from which, as M'Tesa told me, "the river went eastward"? It certainly seemed only too true; and for the moment a thrill of horror ran through my veins: for if it should be true, we were lost!

As we advanced into the lake (since called "Ibrahim") I descried in the distance what seemed to be land . . . an immense sea of lilies, whose heads floated upon the surface like a great hat, and which grew up from an incredible depth.

In his volume† *L'Egypte et Ses Provinces Perdues*, the author says:

Lake Ibrahim, indeed, is a veritable nursery of *Nymphæa lotus*, in the midst of which live the famous lotophagi, whose country, according to ancient authors, was situated on the northern coast of Africa, not far from the Gulf of Syrtes, or Gabes.

On the floating islands formed of the detritus of papyrus the inhabitants of the lake have constructed huts, whence, on our approach, they fled in their rude *pirogues*. The huts, made of the stalk of papyrus and bamboo, were filled with a quantity of rotten fish, which rendered the air pestiferous. But, curious to relate, we saw the natives gathering and eating the bulbs of the lotus, of which they appeared fond.

Following the example of the savages, and forced by want, we also ate the fruit, and soon felt the effect in the torpor which seized us, to the point of obliging us to attach our boats to the papyrus and give ourselves up to the effect of the narcotic, with which the fruit is impregnated.

* * * * * * * *

Before us in the distance the lake seemed entirely shut in by land and a mountain on our right (Djebel Mahorsi). If there should be no outlet, and the river here lost itself, there was nothing left me but to take to the shore and find my way to Mrooli —certainly not far distant. . . . We paddled away, upheld by nervous energy, reaching the distant land about midday, there to find that the lake suddenly narrowed to about 700 yards. It was the river! With what joy we pulled away until we had left the lake that had well-nigh proved fatal to us!

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* Central Africa: Naked Truths of Naked People, Chaillé-Long, pp. 163–173.

† L'Egypte et Ses Provinces Perdues, pp. 32–34.

The travellers arrived during the night opposite Mruli, and, effecting a landing, drew their leaking boats after them. A tent was quickly raised, and, after a summary repast on bananas, the weary navigators sought the welcome shelter, overcome by exhaustion and happy in the consciousness of having demonstrated finally and conclusively the problem of the Nile Source and of having discovered another great watershed in Lake Ibrahim.*

The following morning, August 17th, having caulked their boats as best they might, the travellers resumed their journey, and, arriving opposite a certain point as prearranged, fired a gun as a signal to the escort supposed to be awaiting their coming. The shot in response came not. In place thereof there was heard the lugubrious sound of the war drum, and soon the country swarmed with the hostile Unyoro. An hundred pirogues filled with the naked warriors shot out from the cover of the papyrus jungle and sought to surround the travellers.

Protected by sheet iron travelling cases, which served as ramparts, the navigators fought the enemy with desperation for several hours, and finally escaped. The General Orders published to the army subsequently will serve to show the appreciation of the Government at Cairo†:

"BUREAU WAR DEPT., CAIRO, NOV. 16, 1874.

GENERAL ORDERS
No. 18.

Lt.-Col. Chaillé-Long of the General Staff, on expedition near Lake Albert, was attacked by 400 armed men, enemies of the Khédive, with two soldiers resisted reiterated attacks of that troop and put them to flight. Killing 82 men.

For this brilliant *fait d'armes* and for having successfully accomplished, notwithstanding great difficulties, *the mission confided to him to Uganda*, His Highness the Khédive has been pleased to name Lt.-Col. Chaillé-Long a Colonel in the staff corps.

By order of His Highness the Prince, Minister of War.

THE CHIEF OF THE GENERAL STAFF, STONE."

When the writer was sent to Cairo in May, 1875, to command the land forces in the Expedition to the Juba by Gordon's order a *séance extraordinaire* of the *Société Khédiviale de Géographie du Caire* was convoked for June 11 by the Khédive. His Highness Prince Hussein,

* In September, 1876, General Gordon addressed the following despatch to the Egyptian Government: "Sig Piaggia corroborates the discovery of Lake Ibrahim by Chaillé-Long. The lake is 50 miles wide, a great river runs out in north and east which may be the Assua or the Saubat." The rainstorms and the vegetation appear to have prevented even until the present an accurate map of Lake Ibrahim. There is a map, with description, in *The Geographical Journal* for April, 1899, by Capt. Kirkpatrick, which is not conclusive as to dimensions.

†Bulletin of Société Khédiviale de Géographie No. 2, Fev. et Juin, 1876, p. 223; L'Egypte et Ses Provinces Perdues, p. 271.

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Minister of War, presided. Dr. Schweinfurth, the distinguished African traveller, President of the Society, in introducing the writer, said:

The voyage of Colonel Long Bey has a marked place in the front rank of the grand and glorious voyages to Central Africa. The proofs of courage, constancy and temerity manifested by him are unique in the history of discovery.*

The Marquis de Compiègne, Secretary General, thus sums up the results of Chaillé-Long's Expeditions:

The expedition of Colonel Long Bey was undertaken under exceptionally difficult conditions, without provisions and with but two followers . . .; nevertheless the following results were obtained:

The lake Victoria, discovered by Speke, was visited for the first time in the north, and for the first time a white man navigated its clear waters (Speke saw the lake in the distance, but never visited it).

Returning from the Victoria N'yanza, Colonel Chaillé-Long arrived at Urondogani on the Somerset Nile, whence Captain Speke had been driven away by the Ugos and forced to abandon the navigation of the river, which, according to the natives and many geographers, flowed to the eastward. Colonel Long, braving the threats of the natives, navigated during thirteen days in two *pirogues* that part of the Nile till then unknown from Urondogani to Karumra Falls, whence the river is known to flow into Lake Albert. He discovered about 1° 30′ (bet. L. 0° 52′ 27″ and L. 1° 38′) an important lake, which will bear hereafter the name of Ibrahim, which Long (Ismail Khedive) has given it. Moreover, this voyage has created between the Government of his Highness the Khédive and King M'Tésa, between Egypt and the country of the Equator (a part of which is its property) commercial and political relations upon the importance of which it is not necessary to dwell.

Colonel Long-Bey has also accomplished a journey to the Makraka-Niam-Niam, opening thus across a hostile country a direct road from the Bahr-el-Abiad (at Lado) to the Niam-Niam country, and facilitating in this way the establishment of the Egyptian authority in that region, whose resources in ivory and minerals are immense.

Finally, Colonel Long-Bey has rendered great services to ethnography in bringing to Egypt men belonging to different types of the Niam-Niam races and a specimen of the Akka,† or Tiki (the Obongos of Du Chaillu, the existence of whom was for a long time doubted).

The Royal Geographical Society of London in 1879, replying to the writer's protest against the substitution on a published map of Africa of *Cojae* for *Ibrahim*, referred the writer to General Gordon as responsible. The writer thereupon addressed a note to his former chief on the subject, and Gordon replied as follows:

"MASSOWAH Dec 9 1879

DEAR CHAILLÉ-LONG: I received your letter Oct to day on my arrival from Abyssa. You are very much mistaken if you think I wished to detract from the just

* Bulletin of Société Khédiviale de Géographie No. 2, Fev. et Juin, 1876, p. 223.

† Miani, the Italian, and Chaillé-Long, the American, are the only travellers of modern times who succeeded in bringing from Africa to Egypt and Europe specimens of the Akka, Denga or Ticki-Ticki race of pygmies (L'Egypte et Ses Provinces Perdues, pp. 73–79; Les Pygmées, Quatrefages, pp. 255–56).

merit due to you for your passage from Urondogani to Mruli by calling the lake after the name given by the natives.* Gessi in his voyage around Lake Albert had Mt Gordon, Mt Nubar and a host of names, all of which I objected to as materially useless. However I have written the enclosed to Editor N. Y. H and I think that it should satisfy you and that you can require no more.

I gave my sketch sheets to R. G. S. rough as they were and on them were written the native names. The map was put together when I was in the Soudan and had I known that you would have wished the name given the lake to be inserted, it would have been so: thus Lake Cojae, alias Lake Ibrahim (Long).

Believe me, Yours very truly,
C. G. GORDON"

Gordon's letter, published in the New York *Herald*, January 23, 1880, is as follows:

"MASSAWA Dec 9 1879

To the Editor of the Herald:

Those who may be interested in geographical discoveries will remember that in 1874 Col. Chaillé-Long of the Egyptian staff passed down the Victoria Nile from Nyamyongo where Speke was stopped to M'rooli, thus at the risk of his life settling the question before unsolved of the identity of the river above Urondogani with that below Mrooli.

He also discovered a lake midway between those places which he called Lake Ibrahim. Passing that way afterward I ascertained that the native name of the lake was Cojae and wrote this name on the map . . . In writing thus I in no way wished to take from Col Chaillé-Long the merit due to him for his discovery of this lake or for his perilous journey.

Those who care to study the successive steps which built up the map of the course of the Nile will know that to Speke is due the discovery of one portion, to Baker that of another, and to Col Chaillé-Long that of another portion and of the lake alluded to.

Believe me, yours very truly,
C. G. GORDON."

Notwithstanding the foregoing letters of my former chief, whose authority is incontestable, the writer again remarked, in May, 1881, that the error against which he protested was repeated; he wrote to Sir Rutherford Alcock, President of the Royal Geographical Society, who replied as follows:

"SAVILE ROW, LONDON, July 1, 1881

COL. CHAILLÉ-LONG:

DEAR SIR: I am requested by Sir Rutherford Alcock to inform you that he laid your letter to him of 19th May before the Council of the Society and that they have directed the attention of Mr. Ravenstein (who is engaged in compiling for the Society a large map of Equatorial Africa) to the matter with a view to due credit being given to you for priority of discovery and naming of Lake Ibrahim on the map alluded to.

The Council at the same time disclaimed any responsibility for maps of Africa published by the firm of W. & A. K. Johnston, for whom the late Mr. Keith Johnston must have drawn the map of which you complain.

Your Obdt. Servt.,
H. W. BATES, Asst.-Secretary."

*The Khédive Ismail named the lake *Ibrahim*—a fact well known to Gen. Gordon.

In conclusion, the question of the maintenance of the name of Lake Ibrahim, and the correction of certain errors on sheets 28, 36, and 37 of the map of Africa, were submitted to General Bassot, Director of the Geographical Service of the French Army. General Bassot's reply as to Lake Ibrahim is categoric:

There is for a fact identity between Lake Ibrahim and the lake traced by Macdonald* in 1897 and named by him *Choga*. Besides, all the lakes of this region have retained the European names with which their discoverers have baptized them (Victoria, Albert, Rodolphe, etc.). There is not, therefore, any reason not to maintain that of *Lake Ibrahim*, and this name will be again adopted for subsequent editions of sheet No. 36 of the map of Africa.

CH. CHAILLÉ-LONG.

GEOGRAPHICAL RECORD.

AMERICA.

THE PASSAIC RIVER FLOODS OF 1902 AND 1903.—The régime of this river, the largest in New Jersey, and its recent floods are described by George B. Hollister and Marshall O. Leighton in Water Supply and Irrigation Papers Nos. 88 and 92. The Passaic drainage basin covers 949 square miles, nearly all in the northeastern part of New Jersey. About one-third of the population of the State lives on or near the river, and its water powers have developed great industries in Paterson, Passaic, and other large towns. Its waters, however, are of largest value for municipal supply.

The main gathering-ground of the system is the Highland area, a granitic and crystalline mountain region extending in a belt northeasterly through northern New Jersey into New York, with a width in New Jersey of fifteen to twenty miles. It has a general altitude of 1,000 to 1,500 feet above sea-level.

Adjoining the Highlands on the southeast is the Central Basin, a depression eight to twelve miles wide and thirty-two miles long, standing at an elevation of about 180 feet above tide water. Much of the basin is occupied by marsh or wet lands, easily flooded when the stream rises moderately and widely submerged in great floods. This Central Basin is an agricultural region, occupying 17 per cent. of the entire area of the basin.

The third topographical section is the Lower Valley, densely

* "Une page d'Histoire de la Géographie Africaine." Comptes Rendus de l'Association Française pour l'avancement des Sciences, Congrès de Paris 1900, pp. 1004-1013.

populated, dotted with manufacturing towns, and so narrow that it does not afford sufficient outlet in times of flood. The result is that the congestion of the waters in excessive freshets does great damage to some of the towns and the surrounding districts.

In the flood of 1902 the losses were naturally greater in the agricultural regions of the Central Basin and the narrow Lower Valley below Little Falls than in the valleys of the tributaries among the Highlands. The area of the flooded land was about 32,000 acres. The damage was greatest in the neighbourhood of Passaic, where the loss was not less than $1,000,000. The cause of this flood was excessive rainfall upon snow among the mountains late in February and early in March.

The flood of 1903, between October 8 and 19, was the greatest and most destructive ever known along the Passaic. It was the immediate result of an enormous rainfall, and not, as is most frequently the case, the combined effect of rainfall and the melting of snow. Between October 8 and 11 rain fell to an average depth of 11.74 inches over the Passaic basin. The damage was not less than $7,000,000, about one-third of it in the city of Paterson.

The writers say that under present conditions floods may be expected at frequent intervals. Immunity from floods can be secured only by the construction of catchment reservoirs in the Highlands or of levees in the Lowlands. Levee construction would impede business and would involve more damage than is now caused by floods; but reservoirs in the Highlands may be constructed economically and provide storage to compensate for the period of low water, thus maintaining water-power at Paterson, Passaic, and other points, providing for municipal water supply in the future, and preventing floods.

The Mississippi Floods of the Spring of 1903.—The Weather Bureau has recently published a valuable report on the disastrous floods along the Mississippi River in the spring of 1903 (*The Floods of the Spring of 1903 in the Mississippi Watershed*, by H. C. Frankenfield, District Forecaster, in Charge of River and Flood Service, Bulletin M, 4to, 1904. Pp. 63, Charts XV). This report is abundantly illustrated with half-tone cuts and with fifteen charts, and is altogether a very complete and instructive monograph. The floods of March and April, 1903, which occurred in the lower Ohio and lower Mississippi, were notable because of the unprecedentedly high stages which occurred in the latter river. The stages of the water were, with a few exceptions, greater than any before known

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from Memphis to the Passes, exceeding the previous highest stages (principally those of 1897) from 0.9 feet at New Orleans to 2.8 feet at Memphis. Where the crest stage was below the maximum stage of 1897 the deficiency was usually due to crevasses in the levees. In this way the flood-plane from Helena to Vicksburg was materially lowered. Above Memphis the crevasses in the St. Francis levee resulted in a considerable loss of water, which re-entered the Mississippi by way of the White River, the mouth of which is 87 miles below Helena. Hence the flood-crest at Helena was naturally depressed.

The flood began in a series of heavy rains during February, which were caused by a succession of cyclonic storms of the south-western type, these cyclones being excellent rain-producers. The excess of precipitation during the month ranged from one inch to seven inches, the maximum fall being south of the Arkansas-Louisiana line. In consequence, the river passed the danger line at all points, beginning at Arkansas City on February 20 and at Memphis and Helena on February 22. The rains extended over the watershed of the Ohio, especially in Kentucky, and thus the later flood-wave from the Ohio was received by the lower Mississippi after the latter had risen to the danger line. The Ohio River, with its many mountain tributaries bringing down water from the melting snows, together with the heavy spring rainfalls, was therefore the principal sustaining power of the flood. The heavy rains continued through the first decade of March, and the rivers continued to rise, slowly and steadily. The first flood warnings were issued at Pittsburg and Memphis on February 28, and the last at New Orleans, fifty-nine days later. The Mississippi rose in a long and practically continuous swell from Cairo to the Gulf, as in the previous great flood of 1897, but during the latter the rise extended north to the mouth of the Missouri.

A close study of the flood conditions of 1882, 1897, and 1903 brings out the following interesting and important facts: At Memphis the river was above the danger line in 1903 for 54 days, as against 65 and 53 days in 1882 and 1897, respectively, but it remained at 38 feet or higher for 13 days and at 40 feet for 2 days in 1903; while in 1882 and 1897 the highest stages were 35.2 and 37.1 feet respectively. At New Orleans the river was at or above the danger line (16 feet) in 1882 for six days, with a maximum stage of 16.2 feet; in 1897 it was at or above the danger line for 75 days, and at 19 feet or more for 29 days, with a maximum stage of 19.5 feet; while in 1903 it was at or above the danger line for

85 days, and at or above 19 feet for 43 days, with a maximum stage of 20.4 feet. The conclusion is that the cause of these differences in the three floods in the lower Mississippi River is to be found in the restraining influence of the levees, which have been in course of construction for many years, and especially during the past ten years. These new levees, except where crevasses occurred, served to confine the flood to the immediate channel of the river, and consequently an abnormal increase in the height of the flood-crest was inevitable. The more levees are built, and the more they are improved and strengthened, the higher the stages become.

The overflowed territory comprised 6,820 square miles in 1903, 13,580 square miles in 1897, and previously to 1897 the greatest extent was 29,970 square miles. The losses resulting from the flood are impossible to estimate, even approximately, but they were comparatively insignificant as contrasted with the amount of property saved. The most expensive features of the flood were connected with the strengthening and repairing of levees and with the repairing of railroads.

The Weather Bureau did excellent work in forecasting the flood. The stages forecasted and those actually reached at various places from Cairo to New Orleans are shown in the following table. The forecast at Cairo was made four days, and that at New Orleans twenty-eight days, in advance of the flood-crest:

STATIONS.	FORECAST STAGE, FEET.	ACTUAL STAGE, FEET.
Cairo	50.5 to 51.0	50.6
Memphis	40.0	40.1
Helena	51.0	51.0
Arkansas City	53.0	53.0
Greenville	49.0	49.1
Vicksburg	52.0	51.8
New Orleans	21.0	20.4 to 20.7

The Bulletin contains detailed reports from different sections along the Ohio and Mississippi Rivers, with many excellent illustrations showing the appearance, conditions, and effects of the flood at various points, and a series of charts illustrating the overflowed areas, hydrographs from different stations, precipitation for January, February, and March, 1882, 1897 and 1903, etc. This Bulletin on the floods of 1903, and that by the late Professor Park Morrill on *Floods of the Mississippi River* (Bulletin E, 1897), together furnish a large body of condensed and easily-accessible information

in regard to these floods, which are necessary and characteristic consequences of a series of heavy spring rains over the Mississippi and Ohio watersheds. R. DEC. W.

GLACIAL EROSION IN THE FINGER LAKE VALLEYS.—The fact of over-deepening of the valleys of Cayuga and Seneca Lakes was brought forward by Lincoln twelve years ago (Amer. Journ. Sci., Vol. XLIV, 1892, 290–301) and by Tarr two years later (Bull. Geol. Soc. Amer., Vol. V, 1894, 339–356). Both authors made use of the discordant tributary valleys (*hanging valleys*) as evidences of over-deepening by ice action. Cayuga Lake especially is very tortuous, and is known to be 435 feet deep, and Seneca Lake is 640 feet in depth, while a boring on its delta is still in drift at a depth of 1,080 feet. The tributary valleys hang at least 400 feet above lake level in each case, making the amount of over-deepening over 800 feet in the case of Cayuga and more than 1,400 feet in the Seneca valley—a truly prodigious amount for ice to have eroded.

Tarr (American Geologist, Vol. XXXIII, No. 5, 1904, pp. 271–291) puts forward the evidences which he has observed in ten years' study since writing his first paper. It must be confessed that some of the observations he cites are hard to reconcile with the glacial erosion hypothesis: (1) Not all the tributary streams hang at a uniform level, though the grade of the gorges is not in all cases determinable. (2) The large lake basins have a gorge form. It is hard to conceive of ice concentrating its cutting power along a narrow zone with the winding course of a stream. (3) Angular cliffs, banked with moraine unquestionably not postglacial, and occurring only below the zone of over-deepening, suggest little of the rounding action of eroding ice. (4) Residual decay, on rocks from which postglacial weathering has not yet effaced glacial striæ, does not well correlate with vigorous ice-scouring. (5) A cave in limestone seems to indicate that the over-deepening was at least preglacial. (6) An island in Cayuga Lake would hardly stand in the face of a destructive ice-tongue. (7) The troughs of the Finger Lakes are transverse to the main direction of ice advance, limiting the time of ice erosion to the period when a thin lobe filled these valleys. This diminution in depth also limits the effectiveness of ice as an abrasive agent. (8) It is difficult to imagine—though this is the weakest of the arguments—the product of 1,000 feet of glacial erosion carried south of the divide by overwash action. That this must have occurred if the ice eroded these valleys is indicated by the fact that the morainic deposits, with their

large percentage of materials from still farther north, are totally inadequate to restore the filling of the Finger Lake gashes.

Here surely is an arraignment of glacial erosion. L. M.

INTERGLACIAL GORGE PROBLEM.—The question of the drainage history of the Finger Lake region has long puzzled those working in that field. That the key to the enigma will not be gained by generalized study is evidenced by the fact that so many papers on this locality have been published without definitely settling the problem. Only when detailed work has been done on all the minor questions, such as that of the relative age of the gorges, will the larger problem be settled. One welcomes, therefore, every piece of detailed work, and that of Matson (Journ. Geol., Vol. XII, No. 2, 1904, 133–151), done as a master's thesis after investigations extending over two years' graduate work at Cornell, is a distinct contribution. Mr. Matson shows that a complex series of interglacial gorges exists, that there is possibility of several interglacial periods, and he estimates that the shortest of these was at least as long as postglacial time. One cannot help regretting that he failed to publish the map which he made, and to which he refers continually in the text, for its absence makes the local observations, otherwise of high value, totally unintelligible to any one personally unfamiliar with the field. It will eventually be as the result of such painstaking, detailed work as this of Matson's that the life record of the streams in the Central New York plateau will be worked out.

L. M.

HISTORY OF THE UNITED STATES GEOLOGICAL SURVEY.—The Government has just printed (*Bulletin* No. 227, Geological Survey) an interesting account, written by Chief Clerk Rizer, of the origin, development, and work of this important branch of the public service. All phases of the service are described without any technicalities, so that the reader may get a clear idea of what is done, the methods used, and the purpose to be served. Many may find especial interest in the pages devoted to the preparation of the maps, from the original surveys on which they are based to the drawing, editing, engraving, printing, and distribution of the fine sheets turned out by the Survey. The story is told in 205 pages, including a good index. The *Bulletin* is illustrated with excellent photographs and maps, including a map showing the areas controlled by triangulation or traverse in the year 1903–04.

EXPLORATION IN SOUTH AMERICA.—Erland von Nordenskjöld spent last year in the exploration of the Gran Chaco of Argentina. He is now engaged in another great field to the northwest. His first endeavour is to explore the little known region in the northwest of Bolivia, and to make zoological and plankton researches in Lake Titicaca, with the special view of ascertaining whether this large body of water, which now stands 4,000 metres above the sea, was of maritime origin. He will later undertake archæological, ethnographical, and zoological explorations in the almost completely-unknown forest region through which the Madre de Dios River flows. His scientific assistants are the zoologist Dr. Holmgren and Lieutenant Bildt. The expedition is supported by private subscriptions, and is expected to occupy about a year and a half.

EUROPE.

GEOLOGICAL MAP OF LONDON.—*Nature* (No. 1802) says that the British Geological Survey has issued, in colours, a drift map of the area around London. The scale is one inch to a mile, and the four sheets are sold at 1s. 6d. each. The map will replace the old hand-coloured geological map of London and its environs, the cost of which was 30s. The reduction in price will be a boon to all interested in the geology of the Metropolitan district. The execution of the map was carried out at the Ordnance Survey Office, and the colour printing is excellent.

THE GERMAN COLONIAL MUSEUM.—It has been proved that there is a necessity for the existence, in those countries having colonial possessions, of museums as aids to a better knowledge of their possessions. Such museums exist in England, France, Holland, and Belgium, and exert a great influence. The German Colonial Museum owes its existence to the Colonial Exposition held in 1896. It arose from private efforts, and was opened in the presence of the Kaiser, October, 1899. Later the German Colonial Company guaranteed a certain sum for its maintenance, and with this assistance it has become one of the greatest museums of the world. In the museum are panoramas and dioramas of various parts of the possessions, showing dwellings and manner of dress, articles used by the natives, and the products of the colonies. A botanical section shows the plants used by the inhabitants. There are representations in relief of harbours, atolls, etc. These collections serve to show what will be useful in German colonial possessions. There are also pictures showing the historical development of the colonies,

as well as collections made by the Niger-Benue-Chad Expedition. In April, 1901, a lecture hall was completed, in which 571 lectures were given, illustrated with lantern-slide projections. For teachers there is a series of 12 lectures, which, during last winter's semester, was attended by 250 persons; but it was necessary to arrange four series instead of one, as 926 persons had applied for admission to the course.—(*Deutsche-Kolonialzeitung*, April 7, 1904.)

ASIA.

IRRIGATION IN INDIA.—A second edition of "Irrigation in India," by Mr. Herbert M. Wilson of the Geological Survey, has just been published as "Water Supply and Irrigation Paper No. 87." The first edition was exhausted in a few years owing to the creation of the Reclamation Service in charge of our Geological Survey and the impetus it has given to irrigation in our western States. The second edition has been brought up to date, and its readers will find it a compact and comprehensive history of irrigation in India and account of the more important irrigation works there. The great success of irrigation enterprises in that country is encouraging the development of similar works in other lands. At the close of 1901 the total expenditure upon all classes of irrigation work by the Government of India had been $337,850,000. In the fiscal year 1900–1901 the total irrigation expenditures were $11,500,000 and the revenues were $12,075,000, showing a profit of 7.5 per cent. on the capital outlay for construction. About one-tenth of the entire acreage cultivated was irrigated, and the estimated value of the irrigated crops was $150,000,000.

EXPLORATIONS IN SIBERIA.—A new expedition under Mr. Tolniachoff is being organized by the Russian Geographical Society for the exploration of the region between the mouths of the Yenisei and the Lena Rivers.

THE CLIMATE OF THE RUSSO-JAPANESE WAR FIELD.—Newspaper reports concerning the progress of the war between Russia and Japan have contained frequent allusions to the effect of weather conditions, such as the cold, heavy rains, etc., upon the movements of the troops, but, on the whole, the average reader of these reports has but a vague idea of the climate of the region where this great conflict is taking place. Indeed, the whole subject of the influence of climate upon military operations is one which has received but little attention, although military commanders, to be thoroughly

equipped for their tasks, ought certainly to be cognizant of the conditions of cold and heat, of rain and snow, of ice and flood, of wind and dust, which they are likely to encounter during their campaigns. A short chapter in Maguire's *Outlines of Military Geography* (1899) deals but superficially with this subject.

Recently two short papers have been published which give a very brief outline of the climate of Siberia, Korea, and Manchuria. One of these is by Dr. Frank Waldo on *Climatic Features of the Field of the Russo-Japanese War* (Review of Reviews, May, 1904), and the other is by Professor E. W. Garriott on the *Climate of Siberia, Korea, and Manchuria* (Monthly Weather Review, March, 1904). The winter cold of Siberia is certainly the most striking feature of the climate of this whole district. Under the control of the winter anticyclone of northeastern Eurasia the temperatures in Siberia become excessively low, the January means reaching −60° at the centre of the Siberian "cold pole." This is the result of active radiation in the dry, clear, calm air of the continental interior during the long, cold winter nights. During the winter months the winds along the eastern coast of Asia are prevailingly from the northwest. Hence the cold from the continental interior is carried to the coast, and even for some distance offshore, thus giving the districts bordering on the sea winter temperatures much lower than the mean annual temperatures of their latitudes. These conditions are quite similar to those along the northeastern coast of North America. At Lake Baikal, which cuts the line of the Trans-Siberian Railroad, the monthly mean temperature during the winter months is below zero, the lowest mean −6.8°, being in January. Because of this great cold the lake is usually frozen to a great depth by January, and is in this condition for three or four months. The freezing of Lake Baikal has given the Russians much difficulty; temporary rails have been laid on the ice during the winter, and heavy ice-breakers have also been employed to ferry the trains across when a channel could be kept open. Mercury is frozen for weeks together during December, January, and February in southern Siberia. The Siberian coast has a winter climate which may be compared with that of Labrador. It is very cold in winter and spring, and the harbours are frozen. Hence the difficulty which the Russians have experienced with the freezing of the harbour at Vladivostok, and their desire to secure an ice-free port farther south, which has really been one of the underlying causes of the present war. Woeikof attributes the excessively low winter temperatures of Vladivostok, which has a January mean of 4.6°, to the

fact that at this point the top of the divide, across which the cold air from the interior has to pass, is only 590 ft. high. Hence the protection afforded by the coast range of mountains is much less than it is at other places on the coast.

During the summer the pressures over the continent are low, the winds along the coast are generally on shore, and the temperatures are high. In the interior, where the January mean was −60°, the July mean is + 60°, giving a mean annual range of 120°, the largest to be noted anywhere on the chart of mean annual ranges of temperature. The maximum temperatures during the short summer are frequently above 90° in Siberia, northern Manchuria, and northern Korea, and even as far north as Verkhoyansk, where the January mean is −56.2°, and the absolute minimum temperature has been recorded as below −90°. During the summer the winds are mainly south and southeast along the coast; there is more rain than in winter, and there is much fog along the northern coast.

In Manchuria the many fertile valleys, which will be able to supply much food for the soldiers, are chiefly watered by the summer monsoon rains. Extremes of cold are less marked than farther north, but the rivers are frozen during the winter. Niuchwang has monthly mean temperatures below freezing during December, January, February, and March. In July and August the mean temperatures are 77.7° and 74.4°, respectively 4.1° and 4.0° higher than the corresponding means at New York.

Over northern Korea the winter temperatures fall to 10° to 15° below zero; consequently the rivers are frozen for several months. The prevailing winter winds are cold, from the northwest. In southern Korea the winter temperatures are near zero. Snow falls during much of the winter, even down to the southern point of the peninsula. Chemulpho, on the western coast, has temperatures which average several degrees below those of Washington in winter, but agree closely with those of the same latitude on our Atlantic coast during the rest of the year. At Seul the January mean is 24.3°, and the July mean is 81.1°, Washington, D. C., having 31.8° and 77° in the same months. The summer is warm and rainy, and the relative humidity high. Floods are apt to occur during the warmer months, rendering the streams and roads impassable.

In general, the chief factors to be reckoned with in the war are probably the extreme cold of the winter, more severe in the north, less severe in the south of the field of war, but sufficient to cause much suffering and to change conditions of transportation by the

freezing of the rivers; the snowstorms (blizzards) of the winter; the summer heat, which is likely to cause suffering, especially if the campaign is then going on in the south; the summer rains, with the possible washouts, floods, and difficulty of marching; and for the navies concerned, if the ships should happen to be at sea, the danger of a typhoon during the late summer or early autumn, which might cause a more serious loss than several naval engagements. R. DEC. W.

AFRICA.

THE APPEARANCE AND DISAPPEARANCE OF A MUD ISLAND AT WALFISH BAY.—An article by Mr. F. W. Waldron in the *Transactions* of the South African Philosophical Society, Cape Town (Vol. XI, pp. 185–188), describes an interesting phenomenon in Walfish Bay. The bay is largely protected from ocean storms by a peninsula extending northward from its southern shore and terminating in Pelican Point. On June 1, 1900, the residents saw that an island of mud had risen above the sea near Pelican Point. It was 45 metres long, 9 metres wide, and in its highest part rose 5 metres above sea-level. Its sides were quite steep. The existence of the island was very short, for on June 7 it had entirely disappeared. Its appearance seems to have been due to the existence of a submarine mud volcano near Pelican Point. To this volcano is attributed the exhalation of sulphur gases, which have often been observed there, and which at the time the island was formed were especially strong. The large mortality, from time to time, among the fish in Walfish Bay, is attributed to these exhalations.

LAKE ASSAL.—In his *Report* on Abyssinia (No. 1940, *Daily Consular Reports*), Consul Skinner says that Lake Assal, near the Gulf of Tajura, on the French coast of East Africa, has an immense supply of good salt, and offers excellent prospects to those who may undertake its exploitation. A concession has been granted for the working of these salt beds. Lake Assal is somewhat phenomenal in its conditions. Its surface comprises about 16 square miles. It is surrounded by numerous small, steep mountains, which make it very difficult to travel along the shores. The water is salt to the point of saturation, and at the lowest level of the lake a bed of salt over a foot thick is exposed along the margins. It was not known for years whence Lake Assal derived its water. The problem was solved in 1885 by the French traveller Henry Audon, who, while examining the shores, heard the murmur of a waterfall. He found

a large brook, which threw itself into the lake. It was as salt as the ocean, from which, in fact, its water is derived. The lake lies about 400 feet below sea-level. It is now known that its waters come from three brooks which flow from the Gubbut el Karab, a little bay to the east of the Gulf of Tajura. Thus the waters of the Indian Ocean are carried inland to fill this depression in the interior. The salt from Lake Assal has occasionally been carried as far as Abyssinia.

VON ERLANGER'S EXPLORATIONS IN NORTHEAST AFRICA.—In the years 1899–1901, Carlo Freiherr v. Erlanger made a journey in the southern part of Abyssinia, and southeast along the Jub River to its mouth, which was very rich in geographical results. Starting from Zeila, on the Red Sea, his route was through Harar to Adis-Abeba, Dolo, and Bardera, on the middle Jub, to Gobwen, on the Indian Ocean, at the mouth of the Jub River. His caravan numbered at the start 80 Somalis with 120 camels, 30 men of the Issa tribe, and 5 Europeans, among whom were the physician Dr. Ellenbeck, the cartographer Holtermüller, and the biologist Hilgert. The journey was particularly rich in scientific results, and among its most notable products was a map in four sheets, which has been printed in the *Zeitschrift* of the Berlin Geographical Society (No. 2, 1904).

The surveys were so carefully made that it has been possible to show on the Berlin map a large amount of topographic detail. Every noteworthy feature of the surface was brought into its proper relation with the route survey; for hours at a time the topographer halted from one minute to another to determine a new direction of the route, so that every turn of the road was represented on the route map. The cartographic material was worthy of the best processes of reproduction, and it has been most carefully reduced and generalized on the sheets published by the Berlin Society. Material provided by earlier explorers was utilized as far as it was helpful. The map will be very useful for the improvement of the atlas sheets of this part of Africa.

POLAR.

THE DANISH LITERARY GREENLAND EXPEDITION.—This expedition, for whose safety much anxiety has been felt, is reported from Copenhagen to have returned in good health from Saunders Island, north of Melville Bay, to Danish southwest Greenland. The party, which left Denmark in June, 1902, underwent much

hardship. Its purpose was not so much to explore new regions as to collect the best material for a general description of the island and its people and publish a book which should be both interesting and scientifically accurate. It was sent out at the expense of various societies and private individuals. There were only four specialists in the party. Mr. Ericksen, the leader, was to be the historian. The painter Harald Moltke, known for his paintings of the aurora borealis, was to have charge of the pictorial treatment of the volume. Knud Rasmussen, born in Greenland and master of the native language, was to be interpreter and collector of folk-lore and songs, and Dr. Hertelson, the physician, was to have charge of botanical and ornithological collections and make anthropological measurements and other studies of the natives.

Arriving in Greenland, the party spent the summer with the hunting expeditions of the Eskimos, and also penetrated the west coast to the inland ice, where they discovered that the South Isortok and Evigheds fiords are separated from the true inland ice by a lower region of lakes and streams, which receive the waters of the ice-cap. They also found, between the Evigheds and Söndre Ström fiords, two rows of nunataks, forming virtually two consecutive mountain ranges. These details are not found on any of the existing maps.

After wintering at Jakobshavn, the party, in February, 1903, sledged to the northern Danish colony of Upernivik, whence Ericksen, Rasmussen, and Moltke started along the coast for Cape York. They reached Saunders Island, north of Cape York, at the end of April, where they were found in June by two Dundee whalers. Dr. Bertelson had returned to Europe in poor health.

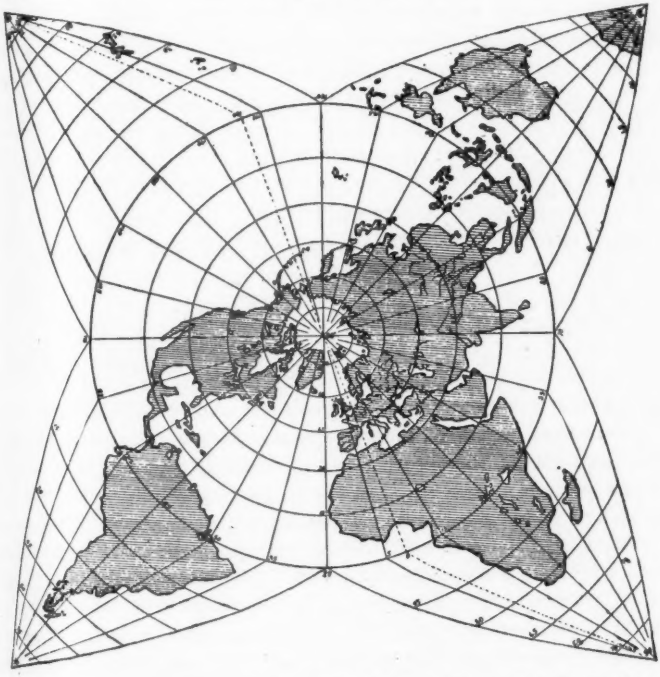
Last fall two Dundee whalers brought news that they found the party in great destitution and dependent solely upon the kindness of the Eskimos for food. Count Moltke was seriously ill. In spite of the perilous situation of the men, the whalers declined to take them on board, but left them some supplies and material with which to build a boat. It appears that, later, Captain Amundsen reached Dalrymple Rock, a little south of Saunders Island, on his way to the west, to begin his work of re-locating the position of the North Magnetic Pole. He further relieved the necessities of the three explorers.

It is reasonable to suppose that their sledge journey along the coast of Melville Bay may take that shore-line out of the category of the uncharted coasts of Greenland. This coast is known in its northern half through the sledge journeys of Peary, but its south-

ern half has been only vaguely outlined. This is the first time that a sledge expedition has skirted the entire coast of Melville Bay.

MAPS.

REPRESENTATION OF THE EARTH ON A NEW STAR PROJECTION.—*Le Bulletin de Géographie Historique et Descriptive* (No. 2, 1902) prints the accompanying map, which is Lieutenant Berthou's representation of the terrestrial globe upon a star projection with four branches. It is interesting as showing the land surface without distortion and with less exaggeration than on other star maps.



The first star map was made in 1865 by Dr. Jäger, Director of the Geological Museum of Vienna. His projection had eight branches, and its parallels formed an irregular octagon. Dr. Petermann later proposed replacing the octagon with a circle. Later maps of this sort have been made with five branches, four branches, etc., but, as far as we know, Lieutenant Berthou is the first to make the stereographic projection the base of his map. This and the Mer-

cator projection alone represent areas without distortion, though there is exaggeration. On Lieutenant Berthou's map the continental forms are well represented in the graphic delineation. By using the stereographic projection, Africa, for example, appears correctly to extend farther north and south than east and west. The contrary impression is given to any one not accustomed to map-reading by the equidistant projection now very commonly employed. This map, perhaps better than any other star map, gives a striking and accurate picture of the world and of the relations of the continents with one another and with the oceans.

AN ECONOMIC MAP OF GERMAN EAST AFRICA.—The *Zeitschrift*, of the Berlin Geographical Society (No. 3, 1904), gives an interesting account of this map, which has been prepared by Dr. Karl Uhlig. The map shows important advance in our knowledge of the largest and most valuable of the German colonies. It is in two sheets, on a scale of 1 : 2,000,000, or 31.56 statute miles to an inch. The first sheet shows the distribution of minerals, of useful animals and plants, of cattle culture and various industries; the second is given to general conditions of vegetation, native agriculture, and the development of plantations. The accompanying text fully explains the variety of information presented. Four classes of roads are shown—the important caravan routes, routes that can be used only in the dry season, native paths from village to village, and native paths that may be used by caravans. The extent and importance of these classes of roads are shown with the greatest clearness, and also the time and cost of land journeys between the chief stations of the Protectorate. Navigation along the coast, on the great central lakes, and along the rivers is shown, the river facilities being very limited. Areas of importance for mineral products, such as gold and other metals, precious stones, graphite, coal, and salt, are indicated in red. The distribution of the elephant, ostrich, zebra, hippopotamus, and rhinoceros is laid down, and also the areas of copal, rubber, and wax production. A series of symbols shows the importance of cattle-raising in various parts of the territory. The distribution of the native forms of vegetation is distinguished from the regions where Europeans have introduced new cultural plants, as coffee, potatoes, vegetables, wheat, and other European grains, vanilla, Spanish pepper, the teak tree, the agave, and cotton. The native agricultural products shown include millet (from which the natives prepare their beer or pombe), maize, rice, manioc, sweet potatoes, beans, peas, bananas, the

mango, sugar cane, peanuts, sesame, and other oil plants, the cocoa palm, and tobacco. Only a cursory examination is required to give an idea of the extraordinary variety of information clearly expressed on the map.

GENERAL.

At its meeting, on April 22, the Paris Geographical Society conferred gold medals on Dr. Sven Hedin and Captain Lenfant.

The Government of Iceland, which, for years, has been endeavouring to secure sufficient funds to lay a cable between the island and Europe, has now appropriated about $10,000 a year for twenty years, to establish wireless telegraphy with Europe and between the principal towns of Iceland.

Dr. Karl Alfred Von Zittel, the well-known Professor of Geology in the University of Munich, and President of the Bavarian Academy of Sciences, died on January 5. He was born in 1839. For many years he has been one of the leading representatives of geological and paleontological science. His great Handbook of Paleontology is a standard authority. As a member of the Rohlfs Expedition to the Sahara in 1873–74 he proved that the Sahara was not an ancient sea-floor, as many had supposed. One of the features that gave especial prominence to his History of Geology was his development of the topic of Physical Geography.

THE SUDAN ALMANAC, 1904.—This interesting publication appears in less than six years after the fall of Omdurman and the end of the Mahdist régime. It is for the use of the European and Mohammedan residents of the Anglo-Egyptian Sudan, and is crowded with helpful information. Along with the calendar is a list of events important in the history of that large region. The Mohammedan and Gregorian calendars are printed in parallel columns.

Among other items are the periods of high and low Nile and of the rainy and dry seasons, the latitude and longitude of twenty-two important towns in Egypt and the Sudan, the Coptic and Abyssinian calendars, a list of the Sudanese officials in the eleven provinces, and the chief town in each province, the distances by the Nile from Damietta and Khartum of all important towns on the river, the distances from one town to another on the Sudan railroad, and the caravan routes, postal and telegraph information, Sudan weights and measures, with equivalents in British and

metric measures, money conversion scales, meteorological notes, the times of sowing and reaping Sudanese crops, and the average quantity per feddan, and many matters of special interest to the army.

Omdurman still has a population of 48,000, while the rebuilt Khartum, the capital of the Sudan, has only 8,000. The total population of Sudan is given at about 1,500,000 to 2,000,000. The estimate of 12,000,000 for the population, before the rise of the Mahdi, may have been greatly exaggerated, though it was decreased to a frightful extent under the rule of the Khalifa. The contents of this pocket manual will be of value to all who are interested in the progress of the Sudan.

NEW MAPS.

AMERICA.

UNITED STATES.—Map of flooded lands in the Passaic Valley. Natural scale, 1:63,360, or one statute mile to an inch. Annual Report of the State Geologist of New Jersey for 1903. Trenton, 1904.

A section of the State map, showing the lands submerged by the great floods of October, 1903; also the site of the proposed controlling dam near Little Falls.

UNITED STATES.—Map of the flooded area in the Central Basin, New Jersey. Natural scale, 1:126,720, or two statute miles to an inch. In "Water Supply and Irrigation Paper" No. 88. U. S. Geological Survey, Washington, D. C., 1903.

A section of the map of New Jersey, showing the basin of the Passaic River, and indicating the areas in the so-called Central Basin of the Passaic that were covered with water in the spring floods of 1902.

UNITED STATES.—Map of the United States, showing localities which produce gypsum. Scale about 275 miles to an inch. U. S. Geological Survey, Washington, 1904.

The map illustrates *Bulletin* No. 223 of the Survey, entitled "Gypsum Deposits in the United States." The centres of gypsum production, shown in red, are widely scattered from near the Atlantic to the Pacific coast.

UNITED STATES.—Map of the State of New York, showing surface configuration and watersheds. Natural scale, 1:760,320, or 12 statute miles to an inch. Supplied by the New York State Museum to illustrate the Report of the State Water Storage Commission, New York, 1903.

Green lines show the boundaries of the drainage basins in the State. Topography is indicated by contours emphasized by shades of brown. The contour interval is 200 feet, except on the coast, where it is 50 feet. The map gives, on a comparatively small scale, a very good idea of the topography of the State and of the extent of the various drainage basins within its borders.

ALASKA.—Southeastern Alaska and part of British Columbia, showing the award of the Alaska Boundary Tribunal, Oct. 20, 1903. Scale, 1:960,000, or 15.1 statute miles to an inch. Department of the Interior, Ottawa, Canada.

The boundary is shown in red, with a gap between the Taku and Stikine rivers where the line was not defined by the Tribunal. This part of the boundary is about to be delimited. The topography is represented by contours, with 1,000 feet intervals, based upon the photo-surveys of the Canadian Boundary Commission. These surveys were made in 1893–1895 while both the United States and Canada were endeavouring to throw all the new light obtainable upon the boundary question.

ARGENTINA.—Geologische Karte der Provinz Buenos Aires. Natural scale, 1:3,500,000, or 55.23 statute miles to an inch. By Prof. Dr. R. Hauthal. *Petermanns Mitteilungen*, Vol. 50, No. 4. Justus Perthes, Gotha, 1904.

The province of Buenos Aires is the largest and, relatively, the most populous in Argentina. The map illustrates a paper by Dr. Hauthal on its geology. The land rises almost imperceptibly from the Atlantic coast as far as Cape Corrientes, from which point to Bahia Blanca the rise is more rapid to plateaux 200 to 350 metres high, surmounted by ranges 450 to 1,250 metres in elevation. These crystalline ridges form the water-partings, and have a marked influence upon the distribution of the cattle industry. Back of these elevations the land slopes gently to the pampas, whose general elevation is only about 100 metres above the sea-level. The coastal strip is everywhere alluvial, but the predominating formation is loess (pampas formation). Eleven tints show the various characters of the rock. Heights in metres are indicated by contours.

AFRICA.

WEST AFRICA.—Allgemeine Übersichtskarte von Kamerun. Natural scale, 1:4,000,000, or 63.1 statute miles to an inch. In "Wanderungen und Forschungen im Nord-Hinterland von Kamerun," by Capt. Franz Hutter. F. Vieweg & Sohn, Brunswick, 1902.

The map was intended to give only a general view of the colony, with its chief topographic and hydrographic features. Important heights are given in metres, and the routes of Barth, Flegel, and Zintgraff are shown.

WEST AFRICA.—Ergebnisse meiner Forschungen im Nord-Hinterland von Kamerun, 1891–1893. Natural scale, 1:500,000, or 7.8 statute miles to an inch. By Capt. Franz Hutter. In "Wanderungen und Forschungen im Nord-Hinterland von Kamerun." F. Vieweg & Sohn, Brunswick, 1902.

This is an excellent example of a detailed route survey. It is based upon previous determinations of the geographical co-ordinates of Kamerun, Mundame, and Barombi. Numerous details of the country from 2 to 4 miles on both sides of the route are given. Elephants and other animals are indicated only where the explorer actually saw them. The predominant kinds of vegetation are indicated as forest, scrub, grassland, swamp, oil palms, wine palms, etc. The approximate tribal boundaries, the chief water-partings, and many barometrical determinations of heights are included in the large variety of information to be found on this mother map. There are also numerous notes on tribes, settlements, flora, fauna, etc., a route profile, and an ethnographical inset map.

MADAGASCAR.—Carte des Missions Catholiques à Madagascar. Natural scale, 1:1,774,080, or 28 statute miles to an inch. Supplement to *Les Missions Catholiques*, Paris, 1903.

This comparatively large production is an excellent map of the island for general purposes. Its nomenclature is extensive, and the results of the French explorations and surveys are generalized to good advantage. The special purpose of the map,

XUM

however, is to show the distribution of the Catholic Missions throughout the island. The boundaries of the Vicariates, the residences of bishops and missionaries, and the locations of churches and chapels are laid down. A glance shows that the great centre of Roman Catholics in places in Madagascar is among the interior highlands of the Hova race, where there are many hundreds of their churches and schools. According to the statistics on the map, there are 1,361 churches and chapels, 2,197 schools, 112,500 Catholic converts, and only 99 missionaries, each of whom, with native assistants, has charge of a considerable number of centres.

SOUTHERN AFRICA.—Central and South Africa. Natural scale, 1:5,600,000, or 88.3 statute miles to an inch. By J. G. Bartholomew. The Edinburgh Geographical Institute, Edinburgh, 1904.

This is the latest and certainly one of the best maps of the part of Africa lying to the south of 12° N. Lat. Nearly all the latest material has been used in its compilation, including Grenfell's map of the middle Congo, the British and American route surveys between Lake Rudolf and the Nile, the investigations of the Moore expedition at Lake Tanganyika and of other parties at Lake Bangweolo, the extension of railroad building, and much other information. The map is thus thoroughly up to date, except for some of the latest German surveys in Kamerun and the readjustment of administrative divisions in the French Congo; but it is, of course, impossible for any map long to embrace the very latest information about Africa.

The map is coloured to show political divisions; the lines of projected railroads are indicated, including the road that is already building between Stanley Falls and Albert Nyanza. The more prominent mountain features are very well shown, though topographic delineation is not one of the strongest merits of the map. There are excellent insets of Cape Town, the environs of Cape Town, Port Elizabeth, East London, Durban, Lourenço Marques, and a part of the Zambezi delta, in which it might have been well to indicate the Chinde branch as the navigable connection between the ocean and the river above the delta.

ASIA.

SOUTH-EASTERN ASIA.—Special map of China, Japan and Korea. Scale, 1:6,000,000, or 97.8 statute miles to an inch. With 9 insets, including the environs of Seoul and Chemulpo, Peking, Hongkong, Port Arthur, Nagasaki, Tokio, and Vladivostok on larger scales. John Bartholomew & Co. The Edinburgh Geographical Institute, Edinburgh. Price, mounted on cloth, 2 sh. net.

This map shows very clearly a large number of place-names and boundaries and hydrographic features. The clear delineation in these respects, however, is obtained by the complete sacrifice of hill shading. Southeastern Asia is presented as level as a floor. All the treaty ports and naval stations are indicated, but the mileage of completed railways is somewhat excessive, the lines from Fusan to Seul and from Seul to Wiju, for example, being marked as finished.

EUROPE.

PORTUGAL.—Porto do Douro. Projectos do Porto commercial e melhoramento da Barra. Natural scale, 1:5,000 or .07 statute miles to an inch. The Commercial Association of Oporto. Oporto, 1903.

Illustrates the project for the removal of the bar at the mouth of the Douro River and the improvement of the river above it, so that a larger amount of shipping may lie along the waterfront of Oporto.

GENERAL.

KARTENBEILAGEN.—The map supplement to the *Geographen-Kalender*, 1904–1905. By Prof. Paul Langhans. Justus Perthes, Gotha, 1904.

These 16 maps, in colours, illustrate, for the most part, important events of geographic or economic interest during the past year. They are: 1, Steamship connections in the western part of the Baltic Sea; 2, The Ofoten R.R. across northern Sweden and Norway, from Luleå on the Baltic to Narvik, at the head of Ofoten Fjord on the Atlantic; 3, The Ethnographical conditions of Macedonia and the territory of the recent uprising; 4, The Petroleum Pipe Line across Caucasia from Baku to Batum; 5, The Water Pipe Line from the Darling Mountains, Western Australia, to the Coolgardie Gold Fields in the desert, with the proposed extension to the Calgoorlie Gold Fields, and an inset showing the positions of Tumut and Bambala, one of which is expected to be the capital of the Commonwealth of Australia; 6, Two maps (a) the French–Ethiopian R.R. completed from Jibuti to the neighbourhood of Harrar, and to be extended to Addis Abeba, and (b) the new boundary between Erytrea, Abyssinia, and the Sudan; 7, The New Alaskan–Canadian Boundary; 8, The New Republic of Panama and the Development of the Colombian States; 9, The New Chilean–Argentine Boundary; 10, Routes of the South Polar Expeditions, 1902–'03; 11, Ship and Sledge Journeys of the English South Polar Expedition, 1902–'03; 12, The Swedish and Scottish South Polar Expeditions; 13, The French Expeditions in the Lake Chad Territory; 14, Hanbury's Journey through the Barren Grounds of Canada, 1902; 15, Prof. A. Wichmann's Journey in New Guinea, 1903; 16, Lands the maps of which are entirely new, largely redrawn or corrected up to date in the Ninth Edition of Stieler's Hand Atlas.

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[AFRICA.] LÜDERITZ-LAND, von Kegel Berg bis Albatross Felsen. [With 4 inset plans and sectional views.] Berlin, Reichs-Marine-Amt, *Sheet No. 165*, 1904. *Scale:* 16 miles = 1 inch. *Size:* 24½ x 33¼ inches. Engraved on copper.

AMERICAN ATLAS, NEW. Containing maps of the several States of the North American Union. Projected and drawn on a Uniform Scale [of 18 miles to 1 inch] by H. S. Tanner. 22 maps. Philadelphia, H. S. Tanner, 1823. folio.

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4. SHEET No. LXII of the 25-inch scale. *Size :* 38 x 25¼ inches. Photozincographed. 1902.

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BOOK NOTICES.

Nuestras Colonias en Guinea. Consideraciones Técnicas, Sociales y Politicas por Federico Montaldo, Vocal y Médico que fué de la Comisaria regia de España en el Africa Occidental (1901). Madrid, Imp. y Lit. del Ministerio de Marina, 1902.

Señor Montaldo has reprinted in this pamphlet of 90 pages an address delivered before the *Real Sociedad Geográfica* on the subject of the Spanish colonies in Guinea, their maladministration and their worthlessness. He succeeds in proving to his own satisfaction—and no one can doubt his competence in the matter—that

Spain would be in every way the gainer if she abandoned her colonies in the Gulf of Guinea; and he advises this course.

His own special studies in hygiene make him incidentally very severe upon the Government and the naval authorities for neglect and improvidence in the equipment of the ships and the troops destined for the colonies; his illustrations being taken, necessarily, from the experiences of 1898. He finds the other European colonies in West Africa—English, French, German, and Portuguese—well administered and prosperous. The picture seems to be overcharged, but the advice may be regarded as sound, for other nations as well as for Spain. They will do best who have least to do with Guinea, with or without railroads and scientific methods.

Giacomo Costantino Beltrami e le sue Esplorazioni in America. Eugenia Masi. Firenze, Tipografia di G. Barbèra, 1902.

The author says in her preface that she has been moved to publish this little book by the desire to bring into clearer light the work of Beltrami as an explorer and, incidentally, to do justice to his personal and political character, naturally dear to one closely related to him by family ties. It cannot be said that this relationship has in any way falsified the point of view. Prof. Masi tells her story plainly and lucidly, with the necessary references, and with no more than the natural sympathy for a man whose career has been overlooked.

It may appear to some of her readers that she overestimates the importance of Beltrami's contribution towards the discovery of the Mississippi sources; but this is, in any case, nothing more than an error of judgment. It is a more serious mistake to impute motives to those who do not happen to agree with her.

The county of Beltrami in the State of Minnesota and Beltrami Island on the map of the glacial Lake Agassiz perpetuate the name of the explorer in official and scientific literature—a double distinction accorded to few wanderers in a strange land.

Greater America. By Archibald R. Colquhoun. x and 436 pp., 11 maps and diagrams, Appendix and Index. Harper & Bros., New York and London, 1904.

This volume gives less attention to geographical description than any earlier book by its well-known author. It is critical rather than descriptive. It deals with all the Americas in their relations with one another and the world at large, and in their character, their ideals, and policies. Naturally the United States, as the

greatest factor and influence in the western world, and as a new colonial power, with far-reaching responsibilities, is the core of the discussion. Largest attention is given to its dominance, its policies and problems, and the ultimate influence which, as the author conceives, they will exert.

The book, while largely concerned with broad political aspects, recognizes throughout the basal influences which geographical environment exerts. Mr. Colquhoun has been known for a quarter of a century as a writer of unusual geographical instinct; and in this discussion of the western world, geographical influence upon the character and development of all the American peoples has its due place, and is set forth with all the more emphasis and lucidity, because the author's talents and training have given him power of expression. His justification of the use of the name "America" to designate the United States is interesting:

> In using the term "America" to the exclusion of the qualifying prefix "United States of," the author is not only avoiding circumlocution, but is technically correct. The citizens of the United States of America must be called Americans, since they have no other word to express their nationality; whereas the Canadians, Brazilians, or Mexicans, geographically Americans, have a distinct national name. The term United States, so frequently used, might be, with equal correctness, applied to other than the North American states, but there is no other people who claim the name Americans, and no other country which could be spoken of as America.

Here are some generalizations with regard to the Panama Canal before the author proceeds to detail:

> The writer has always held that, on account of its geographical position, forming practically part of the future seaboard of the United States, the canal should be built and controlled by her. Its functions in uniting east and west are of the greatest importance to the American nation; and in the development of the vast Pacific, and in the fortunes of the Far East, this great channel of communication between the producing countries of the Pacific and Far East and the manufacturing centres of the United States must be a powerful factor. Distance is being annihilated all over the globe; the isolation of the Orient, with its teeming millions, is a thing of the past; and the vast latent forces lying dormant in the Pacific area will shortly be brought within reach of the manufacturing nations of Europe and America. To Britain, with an overwhelming interest in ocean traffic, the canal will be of great value, bringing us thousands of miles nearer to the Pacific shores of the New World; but there can be no doubt that it will benefit the United States in an infinitely greater degree than Europe. It will divert little or no European traffic from the Suez Canal, but it will confer an immeasurable impetus to the manufactures and trade of the United States, will greatly stimulate her mercantile marine and shipbuilding industry, and will provide a most powerful incentive towards developing her navy.

The illustrations are sketch maps and diagrams relating to transportation and other factors in the problems discussed. All the views of the author may not be accepted, but his book will help any

one who wishes to get a clearer insight into the essence of things American and the conspicuous influences that are helping to shape the destinies of the Western peoples.

The Alaska Boundary. By Professor George Davidson. 235 pp. and 2 charts. Alaska Packers' Association, San Francisco, 1903.

This extended paper was completed by Professor Davidson three months before the Alaska Boundary Tribunal announced its decision in October last. It is an historical, geographical, and critical examination of the whole boundary question. The result of comprehensive and scientific research, it is gratifying that Professor Davidson's work has been put into book form, for it is a compact, well arranged, learned, and, on the whole, a judicial treatment of one of the most important diplomatic questions in our history. A chart exhibits the *lisière*, as claimed by the parties in the dispute, and another shows the relation of Portland Channel to Pearse Channel and the awarded boundary.

Wanderungen und Forschungen im Nord-Hinterland von Kamerun. By Franz Hutter. pp. xii and 578, 130 illustrations, including many photographs and 2 maps. Friedrich Vieweg & Son, Brunswick, 1902. (*Price, 15 marks.*)

This book is a summing up of experiences, impressions, and scientific observations during the last official explorations in the northern hinterland of Kamerun in 1891–1893. For a long time thereafter this part of the Protectorate was wholly neglected by the German Government, but the re-establishment of the station Bali and the reawakened interest in this region, whose resources and tribes have been shown to be worthy of more attention, make the appearance of this exhaustive summary of good work done very timely. Hutter's book happily combines scientific spirit and method with a clear and interesting style; and as he ignores the trivial and seizes upon the essence of things, his book is one of substance. More than half of it is devoted to the results of his observations in that part of the country lying between 4° 30′ and 8° N. Lat., and 9° 30′ and 12° E. Long., in which he first describes the woodlands and their people and then deals with the grass lands and their inhabitants. He depicts the geographical aspects of each division, and then gives much ethnological and anthropological information, sketching the tribes in their life, customs, and arts and social, political, and religious conditions. The book

is illustrated with many half-tone views and also a large number of woodcuts, especially elucidating the native arts. (For notice of Hutter's maps see "New Maps" in this number of the BULLETIN.)

The Louisiana Purchase and the Exploration, Early History and Building of the West. By Ripley Hitchcock. 349 pp., 61 illustrations, 3 maps, and an Index. Ginn & Co., Boston, 1903. (*Price, $1.25.*)

In 1803 the United States purchased from France the region claimed by that country lying between the Mississippi River and the Rocky Mountains. The Louisiana Purchase, as it is called, embraced about one-third of our present territory, and the St. Louis Exposition is commemorative of the great transaction. Mr. Hitchcock tells the story of this large part of our West, including the work of the Spanish and French pioneers, the explorations after the Purchase, and the aspects of the region through its formative periods and up to the present time, when it contains 15,000,000 inhabitants. In this clear and simple narrative Mr. Hitchcock brings together much material that is usually scattered through different volumes, and gives a comprehensive and consecutive view of our early West and the influences that made the region what it has become. Most of the illustrations are drawn from early sources. Lewis and Clark did not hear that Alexander Hamilton had been killed in a duel by Burr till two years after the tragedy had occurred—a fact that illustrates the complete isolation in which they lived during their great journey.

NOTES AND NEWS.

THE EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS.—The Committee of Arrangements announce that the Congress will be opened at the Columbian University Hall, Washington, D. C., on Thursday forenoon, September 8. On the preceding evening an informal reception will be held at Hubbard Memorial Hall by President McGee, of the National Geographic Society. During the three days in Washington general sessions of the Congress will be held in the mornings; the afternoons will be given to sectional meetings, receptions, and other social gatherings. The Congress will be received by Mrs. Gardiner G. Hubbard at "Twin Oaks" on Friday afternoon; by the Smithsonian Institution on Saturday

afternoon; and by Commander Robert E. Peary, President of the Congress, and Mrs. Peary on Saturday evening.

The Congress will be entertained on Monday, September 12th, by the Philadelphia Geographical Society.

The meetings in New York, on invitation of the American Geographical Society, will be held on Tuesday, Wednesday, and Thursday, September 13, 14 and 15.

The general meetings will take place on Tuesday and Wednesday in the auditorium of the American Museum of Natural History, which has courteously offered also accommodation for sectional meetings. Thursday will be devoted to a trip on the Hudson River.

On Friday, September 16, there will be a field meeting at Niagara Falls, and the Congress will spend Saturday in Chicago. On Monday, Tuesday, and Wednesday, September 19–21, the Congress will meet in St. Louis in connection with the Congress of Arts and Science. A trip to the Far West is planned after the adjournment, and, on the return to Washington, President Roosevelt will receive the Congress.

Retirement of Astronomer Russell.—A letter from the Sydney Observatory brings tidings of the illness of Mr. H. C. Russell, the well-known Government astronomer of New South Wales. At the time of writing his health had improved, but he was on leave prior to retiring on a pension at the end of the year, after 46 years of service. Among Mr. Russell's services to geography was the exhaustive paper he wrote on the occasional desiccation of Lake George in New South Wales, parts of its bed having been devoted to crops several times during the past century.

Mr. Francis H. Nichols, who is pursuing his studies of the people in Western Yünnan and Süchwan, writes from Tengyueh, (Momein) under date of April 1, that he is making excellent progress, having adopted the Chinese costume and manner of life. He notes that there are rumours of "some kind of a war between Japan and Russia."

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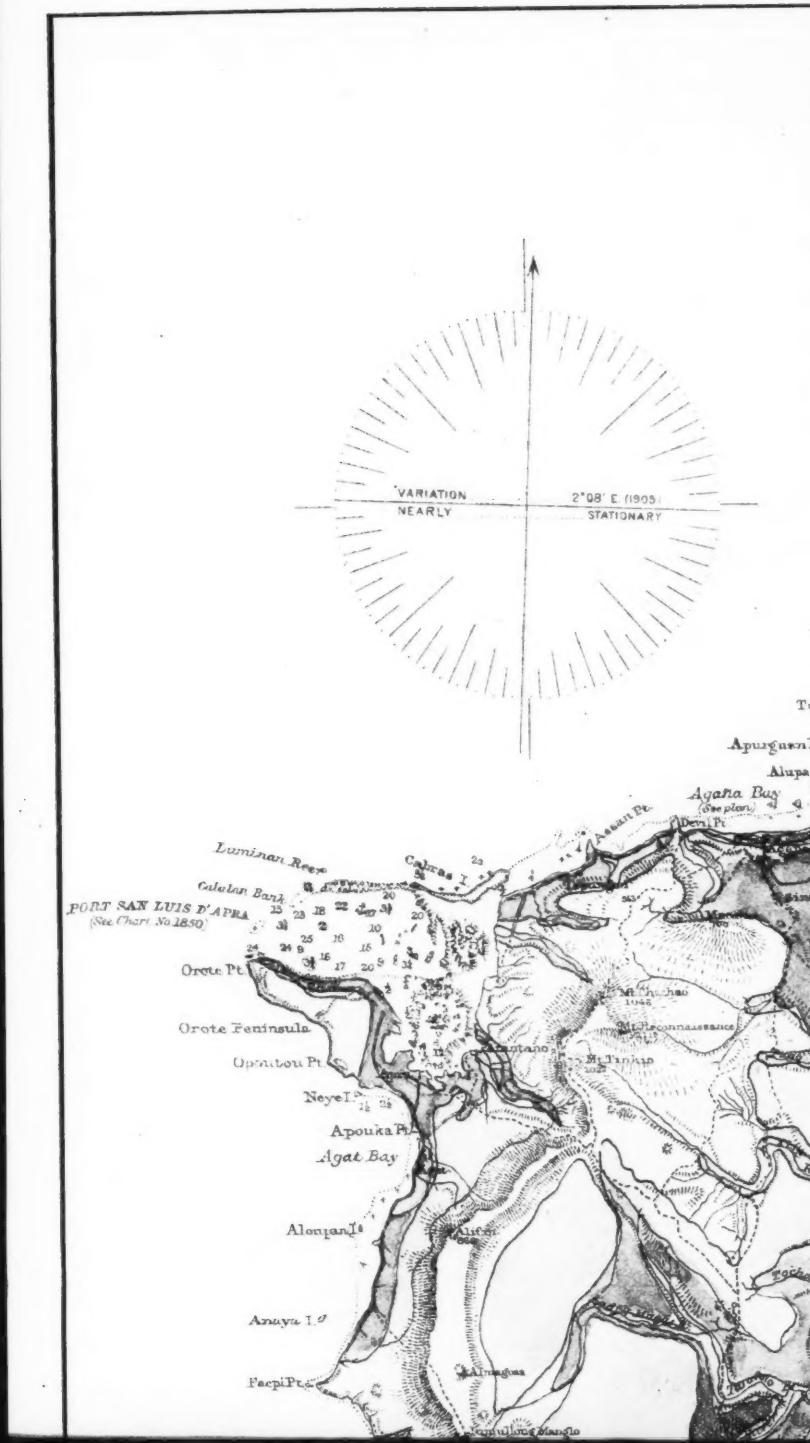
VARIATION
NEARLY
2°08' E. (1905)
STATIONARY
Apurguan Pt.
Alupa I.d
Agaña Bay
(See plan)
Asean Pt.
Luminan Reef
Calubin Bank
PORT SAN LUIS D'APRA
(See Chart No 1850)
Orote Pt.
Orote Peninsula
Opnitou Pt.
Neyel Pt.
Apouka Pt.
Agat Bay
Alompan Id
Anaya I.d
Facpi Pt.
Alifan
Almagosa

Ratidian Pt.
Pagon Pt.
heavily wooded
Tanagay
Punay Pt.
Lafitic Pt.
Amantea Pt.
Sanchez Pt.
Hanuum Pt.
Tumun Bay
Tumun Pt.
Mokfuk
Puget Pt.
Sancio
Alupa Ie
heavily wooded
Fadigan Pt.
Iates Pt.
Port Pago
Pago Pt.
Ylue Bay
Port Tarofofo
(See plan)
Matala Pt.

XUM

Apurguan Pt.
Alupa Is.
Agaña Bay
(See plan)
Devil Pt.
Asaan Pt.
Luminan Reefs
Calbras I.
Galelan Bank
PORT SAN LUIS D'APRA
(See Chart No. 1850)
Orote Pt.
Orote Peninsula
Opnitou Pt.
Neye I.
Apouka Pt.
Agat Bay
Alomjan I.
Anaya I.
Facpi Pt.
Umata Bay
(See plan)
Machadgan Pt.
Mt. Schroeder
Mt. Santa Cruz
Asdons
Ynarajan
Port Ynaraja
Agfayan Bay
Ajuyan Pt.
Asdudas I.
Tchiaouda Is.
Cocos Island
(Pagan I.)
Malolos
Tumon Bay
Pago R.
Agaña R.
Tumon Pt.

XUM

SLAND OF GUAM.

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